PB-229 208

# TRANSCRIPT OF HEARING ON POLLUTION OF INTERSTATE WATERS OF THE MISSOURI RIVER HELD AT ST. JOSEPH, MISSOURI ON JULY 27-30, 1959

Public Health Service
Washington, D. C.

30 July 1959

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TRANSCRIPT OF HEARING

PB 229 208

# POLLUTION OF INTERSTATE WATERS
# MISSOURI RIVER

## ST. JOSEPH, MISSOURI

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

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JULY 27-30, 1959

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# HEARING AT ST. JOSEPH, MISSOURI CONCERNING POLLUTION OF THE INTERSTATE WATERS OF THE MISSOURI RIVER

Pursuant to notice, this hearing convened at 9 o'clock a.m. on Monday, July 27, 1959, in the Empire Room of the Robidoux Hotel, St. Joseph, Missouri, before a five-man board.

MEMBERS OF THE BOARD:

Mr. John S. Samson, Chairman, Nebraska Water Pollution Control Council, Omaha, Nebraska;

Mr. Blucher A. Poole, Technical Secretary, Indiana State Stream Pollution Control Board;

Dr. Geoffrey M. Martin, Executive Secretary, Kansas State Board of Health, Topeka, Kansas;

Mr. Freeman R. Johnson, Water Pollution Board of the State of Missouri, Joplin, Missouri;

Mr. Walter Kurylo, Bureau of Public Roads, Washington, D. C., representing the U. S. Department of Commerce.

Mr. Robert Ayers, Washington, D. C., Secretary to the Board.

## APPEARANCES

For the Government:

Mr. Murray Stein, Chief, Enforcement Branch, Division of Water Supply and Pollution Control, Public Health Service, Washington, D. C.

Mr. Sidney Edelman, Assistant Chief, Public Health Division, Office of General Counsel, Department of Health, Education and Welfare, Washington, D. C.

Mr. Glen J. Hopkins, Regional Engineer, Public Health Service, Region VI, Kansas City, Missouri.

For the City of St. Joseph:

Mr. Fred E. Schoenlaub, City Counselor, St. Joseph, Missouri.

For various industries:

Mr. R. A. Brown, Attorney
212-1/2 North Sixth
St. Joseph, Missouri

Mr. Charles Wilcox, Attorney
804 Corby Building
St. Joseph, Missouri

- - - -

CHAIRMAN SAMSON: Good morning, gentlemen. At this time I will now call this meeting to order.

This hearing is called pursuant to an order issued from the Secretary of Health, Education and Welfare, Washington, D. C., concerning generally the pollution problem and the pollution allegedly of interstate waters in the St. Joseph, Missouri, Atchison, Kansas, and Kansas City, Kansas, and Kansas City, Missouri, area.

Mr. Ayers, Mr. Robert Ayers, from Washington, D. C., has been designated at a meeting of this Board as its Secretary and I will now call on Mr. Ayers to read publicly and present for the purpose of this meeting the notice that was issued calling this meeting in order.

Mr. Ayers.

SECRETARY AYERS: Mr. Chairman.

Published in the Federal Register on Wednesday, July 1, 1959, is the notice of this hearing as follows:

"Department of Health, Education and Welfare, Public Health Service, Water Pollution Control. Public hearing concerning pollution of the interstate waters of the Missouri River, St. Joseph, Missouri. Notice of Public Hearing.

"Whereas, on the basis of reports, surveys and studies, the Surgeon General, having reason to believe that pollution of the Missouri River caused by discharges of untreated sewage and industrial wastes by St. Joseph, Missouri, and its associated stockyard area, was endangering the health and welfare of persons in Kansas, a state other than that in which the discharges originated, called a conference pursuant to Section 8 of the Federal Water Pollution Control Act (70 Stat. 504,33 U. S. C. 466g) with respect to the pollution of the interstate waters of the Missouri River below St. Joseph, Missouri, and

"Whereas, such conference was held on June 11, 1957, at St. Joseph, Missouri, and

"Whereas, the conferees representing the official State water pollution control agencies of the States of Missouri and Kansas, and the Surgeon General of the Public Health Service unanimously agreed:

"1. That pollution of interstate waters subject to abatement under the Federal Water Pollution Control Act is occurring in the Missouri River-St. Joseph, Missouri area (Missouri-Kansas). Sewage and industrial wastes from St. Joseph, Missouri, and its associated stockyard district in Missouri are finding their way into the waters of the Missouri River, an interstate water as defined by the Federal Act. Such discharges cause pollution of the Missouri River so as to endanger the health and welfare of persons in Kansas, a State other than that in which the discharges originate.

"2. That the effects of this pollution are: (1) Deterioration of water quality for the public water supply of Atchison, Leavenworth and Kansas City, Kansas, with associated enhancement of possible disease transmission; (2) increased concentration of coliform and other organisms associated with human diseases which constitute a health hazard to commercial and recreational users of the river; (3) deterioration of water quality so as to interfere with its use for stock watering; (4) deterioration of water quality so as to prevent full use of the commercial fishery of the Missouri River below St. Joseph, Missouri; (5) deterioration of water quality so as to create conditions inimical to fish and wildlife in the area; and (6) impairment of water quality for many industrial uses.

"3. That the measures presently used for the disposal of sewage and industrial wastes from St. Joseph, Missouri, and its associated stockyard district are not adequate to secure abatement of pollution of the interstate waters of the Missouri River.

"4. That the delays encountered in abatement of such pollution are due to lack of installation of adequate waste treatment facilities or other methods for reduction of pollution by St. Joseph, Missouri, and the industries concerned.

"5. That the City of St. Joseph, Missouri, and the industries of its associated stockyard district provide adequate treatment of wastes prior to their discharge, and

"(a) That detailed plans and specifications for facilities to treat these wastes be completed by June 30, 1958,

"(b) That contract awards for construction of these facilities be made by January 1, 1959,

"(c) That the City of St. Joseph, Missouri, submit the financing of the City's proposed waste treatment facility to its voters on November 12, 1957; and

"Whereas, a financing proposal for the proposed waste treatment facility was rejected in an election held on March 4, 1958, and

"Whereas, the City of St. Joseph has not submitted such proposal or any other proposal for financing the proposed facility to its voters since March 4, 1958, and

"Whereas, the Surgeon General of the Public Health Service on December 9, 1957, recommended to the Missouri Department of Public Health and Welfare that it take necessary remedial action under the state law to secure compliance with the recommendations of the conferees, and

"Whereas, I find that such remedial action has not been taken and that other action reasonably calculated to secure abatement of such pollution has not been taken by the City of St. Joseph, Missouri, and the industrial establishments located in and adjacent to the City,

"Now, therefore, pursuant to section 8(e) of the Federal Water Pollution Control Act (70 Stat. 505, 33 U.S.C. 466g(e)), I hereby call a public hearing to begin at 9 a.m. c.s.t. on July 27, 1959 at the Empire Room, Hotel Robidoux, 5th and Francis Streets, St. Joseph, Missouri, before a Hearing Board composed of the following named persons:

Mr. Chester S. Wilson, Chairman.
Dr. Geoffrey M. Martin (representing the State of Kansas).
Mr. Freeman R. Johnson (representing the State of Missouri).
Mr. Walter Kurylo (representing the United States Department of Commerce).
Mr. Blucher A. Poole.
Mr. John S. Samson."

CHAIRMAN SAMSON: Mr. Ayers, may I interrupt you just for a moment? I realize that it might be a little less than comfortable in the room and as this meeting is more or less on an informal side, to a degree, I want to say now to make yourselves comfortable; feel free in removing your coats and neckties, if you care to. I am sure the Board is going to resolve in that direction before too long.

And as far as photographers and pictures are concerned, you are perfectly free to take as many of those in that respect as you care to. And smoking is allowed, of course, if you care to.

Thank you.

SECRETARY AYERS: "On the basis of the evidence presented at such hearing, the Board shall make findings as to whether St. Joseph, Missouri, and the industrial establishments located in and adjacent to that City are causing or contributing to the pollution of the interstate waters of the Missouri River in the St. Joseph, Missouri area which endangers the health or welfare of persons in states other than Missouri, and whether, if it so finds, effective progress toward abatement thereof is being made. If said Board finds that such pollution is occurring and that effective progress toward abatement is not being made, said Board shall make its recommendations to me concerning the measures, if any, which it finds reasonable and equitable to secure abatement of said pollution.

"Notice of such public hearing is hereby given to the following:

"Missouri Department of Public Health and Welfare, Kansas State Board of Health, City of St. Joseph, Missouri, Albers Milling Company, American Cyanamid Company, Anchor Serum Company, Archer-Daniels-Midland Company, Armour and Company, Bartlett and Company, Consumers Cooperative Association, Dannen Mills, Incorporated, Kees-Lyons Oil Company, St. Joseph Feed and Supply Company, St. Joseph Power and Light Company, St. Joseph Stockyards Company, Seitz Packing Company, Stratton-Theis Grain Company, Swift and Company, Swift and Company (Fertilizer Plant), the Agricultural Chemical Division Plant, Terminal Warehouse of St. Joseph, Union Terminal Railroad (Missouri Pacific Railroad).

"Dated June 25, 1959." Signed by Arthur S. Flemming, Secretary of Health, Education and Welfare. And the great seal of the department attached.

Subsequent to the notice, Mr. Chester S. Wilson, who was named as Chairman, directed this letter to Secretary Flemming, it is dated July 20, 1959, in which he says;

"Dear Mr. Secretary: I regret that on account of unforeseen physical disability it will be impossible for me to serve on the Board which you appointed to hold a hearing on the pollution of the Missouri River at St. Joseph, Missouri, opening July 27th under the Federal Water Pollution Control Act. I, therefore, hereby resign as a member and Chairman of the Board."

That was accepted by the Secretary and this wire was directed to the Honorable John S. Samson, Chairman of the Nebraska Water Pollution Control Council:

"Resignation of Chester S. Wilson because of physical disability as Chairman of Hearing Board in the matter of pollution of interstate waters of Missouri River - St. Joseph, Missouri, leaves a vacancy. Pursuant to Section

81.3(b) of Public Health Service Regulations you are hereby designated as Chairman of such Board." Signed Arthur S. Flemming, Secretary of the Department of Health, Education and Welfare.

CHAIRMAN SAMSON: Does that complete the reading of the Notice and the allied papers, Mr. Ayers?

SECRETARY AYERS: That does, Mr. Chairman.

CHAIRMAN SAMSON: All right. Thank you.

At this time I would like to introduce the members of the Board to you ladies and gentlemen and ask each member as I call his name to please stand and remain standing until I have finished the presentation.

We have Dr. Geoffrey M. Martin, Executive Secretary of the Kansas State Board of Health at Topeka, Kansas, on my far left.

Sitting right next to him is Mr. Blucher A. Poole, Technical Secretary of the Stream Pollution Board of the State of Indiana.

To my immediate right Mr. Walter Kurylo of the Bureau of Public Roads, representing the United States Department of Commerce, Washington, D.C.

And right next to him and on my far right is Mr. Freeman R. Johnson, member of the Missouri Water Pollution Board of the State of Missouri, representing the municipalities of that state.

Thank you.

At this time I believe that I will call for the appearances of all the parties interested in the proceedings. First I will call for the appearances on behalf of the Surgeon General of the United States Public Health Service, and I would respectfully call on Mr. Ayers.

Mr. Ayers, would you kindly go over the notice and call for appearances, all appearances?

SECRETARY AYERS: Appearances for the Government, please.

MR. STEIN: My name is Murray Stein. I am Chief of the Enforcement Branch, Division of Water Supply and Pollution Control, Public Health Service, and I am appearing for the Surgeon General of the Public Health Service.

Also appearing for the Surgeon General are Mr. Sidney Edelman, Assistant Chief Public Health Division, Office of the General Counsel, Department of Health, Education and Welfare, and Mr. Glen J. Hopkins, Regional Engineer of the Public Health Service with Headquarters in Kansas City, who will serve as a Technical Consultant.

SECRETARY AYERS: The Missouri Department of Public Health and Welfare.

MR. SMITH: Jack K. Smith, Executive Secretary of the Water Pollution Board, Jefferson City.

SECRETARY AYERS: Kansas State Board of Health. Anyone representing the Kansas State Board of Health?

DR. MARTIN: Mr. Ayers, I believe that there will be representation later. Our representative is ill at the present moment.

SECRETARY AYERS: Thank you. City of St. Joseph.

MR. SCHOENLAUB: Fred Schoenlaub, City Counselor.

SECRETARY AYERS: Spell it, please.

MR. SCHOENLAUB: S-c-h-o-e-n-l-a-u-b.

SECRETARY AYERS: Now, Mr. Brown, you told me that you were representing some industries?

MR. BROWN: I will give you the names of the industries, Mr. Ayers.

SECRETARY AYERS: Please.

MR. BROWN: R. A. Brown, Brown, Douglas & Brown, 212 1/2 North Sixth, St. Joseph, Missouri. We represent Swift and Company, Armour and Company, Seitz Packing Company, St. Joseph Stockyards Company, Anchor Serum Company, Terminal Warehouses, and Lederle Laboratories.

SECRETARY AYERS: All right.

MR. HARRY A. BOSTROM: Mr. Chairman, might I correct the last designation of Lederle Laboratories? The corporate name is American Cyanamid Company. Lederle Laboratories is a division. I merely want to correct that for the record.

SECRETARY AYERS: All right.

CHAIRMAN SAMSON: Thank you.

SECRETARY AYERS: Are there any others?

MR. WILCOX: Charles Wilcox, attorney in St. Joseph, 804 Corby Building, representing the St. Joseph Light and Power Company, the Union Terminal Railroad Company, Missouri Pacific.

SECRETARY AYERS: Any other appearances?

MR. HARRIS: Christopher Harris, Stratton-Theis Grain Company.

MR. WASSERMAN: My name is Max Wasserman, attorney, representing the Consumers Cooperative Association with offices in Kansas City, Missouri. Also representing the Consumers Cooperative Association is Mr. Tom C. Cory, Chief Engineer, Kansas City, Missouri.

SECRETARY AYERS: Any others?

MR. CARBRY: J. T. Carbry, representing Bartlett & Company.

SECRETARY AYERS: Any others?

MR. LINES: George O. Lines representing Dannen Mills.

SECRETARY AYERS: What was the name again, please?

MR. LINES: L-i-n-e-s, George Lines, representing Dannen Mills.

CHAIRMAN SAMSON: Would you be so kind as to give us your addresses? Mr. Brown, I take it you are practicing law?

MR. BROWN: She has my address. I am a lawyer in St. Joseph.

CHAIRMAN SAMSON: Fine. And you other gentlemen, will you give the reporter your addresses so we will have those available, please.

MR. LINES: Just St. Joseph, Is that sufficient?

CHAIRMAN SAMSON: Thank you.

SECRETARY AYERS: Are there any others?

MR. WASSERMAN: Max Wasserman, 3315 North Oak Trafficway, Kansas City 16, Missouri. The same address for Mr. Cory.

MR. HARRIS: For the Stratton-Theis Company the address would be 1108 Corby Building, St. Joseph.

SECRETARY AYERS: Are there any others? That seems to be it.

CHAIRMAN SAMSON: Thank you, Mr. Ayers.

SECRETARY AYERS: Now, the Notary is here, Mr. Chairman. What we would like to do, we have the Notary Public available now to swear the witnesses. Are you ready to have the Government witnesses sworn?

MR. STEIN: We are ready to have some of the Government witnesses sworn.

SECRETARY AYERS: Would you call those that you have and we will have them sworn now.

CHAIRMAN SAMSON: I wonder, Mr. Ayers, if we could wait with that for just a few moments until I get one or two other matters out of the way.

SECRETARY AYERS: Oh, surely. I am sorry.

CHAIRMAN SAMSON: I would like to say at this time that if during the process of the meeting or process of the hearing here there should be other persons or other organizations who might be interested in this hearing and would like to present evidence or like to be heard, I think so that we have got some scheme of operation that it might be well that they make a request to be heard to the Secretary, Mr. Ayers, and he will at that time present that request to the Board and the Board will act on it at that time.

I might also say that if there are certain groups of individuals or organizations who would like to be heard, that it might be well to facilitate this hearing if these groups, associated groups, could get together and sort of organize the hearing so that possibly they could have a common spokesman. It is not the purpose of the Board nor of the Chairman to restrict the hearing in any manner, way, shape or form, but I just throw that out for whatever it might be worth.

In connection with the order of the hearing, let me say that we feel that there should be a presentation of the evidence by the representatives of the Surgeon General and then after they have closed their part of the case any evidence by state agencies and then the evidence that might be presented by those charged with the pollution and then others as they appear. And then, of course, at the end of the hearing oral arguments.

Now, in connection with the ruling on all motions and objections and exceptions thereto, the exceptions will be automatic and at a meeting of the Board it was determined that all motions and objections may be ruled on by the Chairman. However, there may be an appeal by any member of the Board or by Counsel of any interested party in the course of the examination on any ruling that the Chairman might make.

Generally speaking, we will follow the procedure where the Counsel will present the witness and he will then be turned over for cross-examination by opposing Counsel and then members of the Board will be permitted to ask questions as the hearing proceeds. It certainly isn't our purpose to limit cross-examination, to limit argument or to limit any evidence that might be relevant and material.

I forgot to mention that opening statements will be permitted by the various Counsel.

Now you had a matter, Mr. Ayers?

SECRETARY AYERS: The swearing of the witnesses.

CHAIRMAN SAMSON: I wonder, before we get into that matter whether or not there is any matter to be presented to the Board by anyone before we get into the formal matter of this hearing?

MR. STEIN: Yes, sir.

CHAIRMAN SAMSON: All right, Mr. Stein:

MR. STEIN: At this point, for purposes of the record, I should like to enter Affidavit of Service of the Notice just read by Mr. Ayers. This service was made by registered mail, return receipt requested. The Affidavit of Service so indicated is signed by Dorothy K. Warren, who is in charge of these matters for the Public Health Service. Attested to with a Notary seal and attached to the Affidavit are the signed returned receipts showing receipt of such service.

CHAIRMAN SAMSON: Will you show that to opposing Counsel and then introduce it?

MR. BROWN: There will be no objection.

CHAIRMAN SAMSON: Your remarks just brought something to my mind, Mr. Stein. I am generally not too familiar with the practice in Missouri, but in Nebraska when we refer to an exhibit that is to be introduced in evidence we usually have it marked as an exhibit and then as you go through the taking of the testimony, questions and cross-examinations, I think it facilitates the hearing. If you would, therefore, turn your exhibit over to Mr. Ayers so that he may mark it for identification, and then you can refer to it by number.

Now, generally that is our practice up there and we will follow that method of procedure on exhibits, have them marked and then refer to them by number, if that is agreeable with you, gentlemen.

MR. BROWN: That is agreeable with me.

MR. STEIN: Yes, sir.

CHAIRMAN SAMSON: All right. Is there anything further, Mr. Ayers?

SECRETARY AYERS: I have just been advised, Mr. Chairman, that arrangements have been made for an inspection of the river either by boat or by land, if the Board would care to go and do that. I understand that a boat will be available at 1:30. Am I correct in that Mr. Clare?

MR. HERBERT CLARE: That is correct.

(Off the record.)

CHAIRMAN SAMSON: And how long will it take on the trip?

MR. CLARE: The boat trip should take less than an hour and then we would like to take you on a short tour of some of the major outfalls by car and the entire trip should take not more than an hour and a half.

CHAIRMAN SAMSON: And be back here at 3 o'clock, is that right?

MR. CLARE: Yes, sir.

CHAIRMAN SAMSON: Well, then, Mr. Stein and Mr. Brown, Mr. Schoenlaub, why don't you gentlemen get together and determine who should go on that trip with the Board and we would probably like to have the press go along on that trip also.

Are there any motions, any matters to be disposed of before we proceed now into the formal matter of this hearing?

There being none, do you have an opening statement on behalf of the Surgeon General, Mr. Stein?

MR. STEIN: Mr. Chairman, under Section 8 of the Federal Water Pollution Control Act pollution of interstate waters which endangers the health or welfare of persons in a state other than that in which the discharge originates is subject to abatement. This abatement must be carried out in accordance with the procedure specified in the Act.

The abatement procedure consists of three main steps: 1, a conference; 2, a public hearing such as this; and 3, if necessary, court action.

As indicated in the notice of this hearing, the Surgeon General of the Public Health Service has in the past called such a conference. This conference was, in fact, held at St. Joseph, Missouri, on June 11, 1957. At the conclusion of that conference the conferees unanimously agreed that pollution subject to abatement under the Federal Act was occurring and that such pollution was caused by sewage and industrial wastes from St. Joseph, Missouri, and its adjacent stockyard district.

The conferees also established a time schedule for remedial action. Neither St. Joseph nor the industries concerned have taken remedial action to comply with this time schedule and I think the evidence adduced at this hearing will bear that out.

All steps required by law have been taken by the officials of the Federal Government and the States before the calling of this conference by the Secretary of Health, Education and Welfare.

Subsequent to the conference, summaries of the conference were prepared and distributed to the conferees as required by law. The Surgeon General has recommended to the official Missouri Pollution Control Agency that steps be taken under its state law and state program to secure abatement of pollution by St. Joseph and its adjacent industries.

The evidence presented to this hearing will show that after many efforts to secure such action the official State Water Pollution Control Agency of Missouri was continuously thwarted and requested that a hearing be held under the Federal Act as soon as possible.

The law provides that if after the holding of a conference remedial action is not taken which is reasonably calculated to secure abatement of pollution, the Secretary of Health, Education and Welfare is required to call a hearing. This duty is mandatory on the Secretary by law and he has called this hearing in accordance with the statute.

In order for pollution to be subject to abatement under the Act it must be pollution of interstate waters and it must endanger the health and welfare of persons in the state other than that in which the discharge originates. Interstate waters is defined in the Act as all rivers, lakes and other waters that flow across or form a part of boundaries between two or more states. I think the evidence will show the obvious, that the Missouri River meets this statutory definition of interstate waters.

The evidence will also show that we are dealing with a regulated stream. Since the installation of many impoundments above Gavins Point on the Missouri River, a specified amount of water flows by, more or less, St. Joseph and downstream cities all the time. This is regulated for the navigation and the nonnavigation season.

Now, the evidence will show that in the foreseeable future this pattern of stream regulation will remain the same. There will not be any increase in flow of water for carrying away wastes. The water flowing past here at the present time is just about the amount of water that is going to continue to flow past.

The evidence will also point specifically to where the pollution comes from. This will be done sewer outfall by sewer outfall.

The evidence will show that the major contributors to this pollution are the City of St. Joseph and the industries named in the notice to this hearing.

The evidence will show that the wastes from this area are the usual municipal wastes and wastes from meat processing plants and associated industry.

Our evidence will show that these wastes are amenable to known reasonable methods of treatment.

The evidence will consist of visual observations of these wastes and will also consist of analyses made by chemists, biologists, bacteriologists and engineers in accordance with standard procedures for evaluating such matters.

I think the evidence will show that we are dealing with a hard factual situation. When you examine the waters of the Missouri River flowing down below St. Joseph, the physical facts are there. It just takes someone to go out, get the water, put this water through usual procedures and come up with the result.

Now, the evidence will also show that the municipal wastes from St. Joseph are untreated wastes from the toilets, bathrooms, garages, street washings, and other commercial establishments of a city of almost 80,000 people, and this combines with the wastes from industries located just outside this district.

This tremendous amount of wastes pours into the Missouri River and just 24 river miles below St. Joseph is the water intake of Atchison, Kansas. A little way below that is the water intake of Leavenworth, Kansas, and below that, of course, the water intake of Kansas City, Kansas

The evidence will show that wastes from a large city of this kind and a city processing materials from warm blooded animals contains large amounts of pathogenic organisms and toxic materials which adversely affect a large variety of water uses in Kansas, a state other than that in which the pollution originates.

The evidence will show that this creates a deterioration of water quality used for water supply. This results in very high disease-bearing indicator organism counts in water plants downstream and it also creates taste and odor problems for water plants downstream.

The evidence will show that these disease-bearing organisms in the water and the other toxic materials are a hazard to people using the water or coming into contact with the water for a variety of reasons, swimming, boating, water skiing, fishing, and so forth.

I think the evidence will also show that the recreational use of the river, particularly boating and water skiing, is increasing by leaps and bounds.

The evidence will also show that in this area of the country the large population group in Kansas is in the eastern part of the state and the big place for Kansans to exercise water recreation is the Missouri River.

The evidence will also show that stock come down to the water, cattle and hogs, and drink and have their body come into contact with water containing the substances we have indicated before to be present.

The evidence will show a deterioration of the water quality so as to prevent its full use as a commercial fishery and the evidence will show that there is a deleterious effect on fish and aquatic life in the area.

I would like to clarify one point. We have been instructed by the Surgeon General to assist the Board in its fact-finding procedures and we would like to be helpful to the Board in any way we can. We are not here in the nature of a prosecuting role and our function is to bring out all relevant facts in the matter. If we can be of any further assistance to the Board or Counsel representing the other parties named in the notice, we shall be happy to cooperate.

Thank you, sir.

CHAIRMAN SAMSON: Thank you, Mr. Stein.

Any opening statements now by any of the political subdivisions that are named in the notice? And I am asking any opening statements by anybody from the State of Kansas.

Any statements or remarks by anyone for and on behalf of the State of Missouri?

Any opening statements for and on behalf of any other state that might be involved or charged in the notice?

Any statement, opening remarks, by any of the other political subdivisions? Now I am talking particularly about the City of St. Joseph, Missouri.

MR. SCHOENLAUB: Not at this time, Your Honor.

CHAIRMAN SAMSON: In other words, you have no opening statement you wish to make, is that right, Mr. Schoenlaub, at this time?

MR. SCHOENLAUB: Yes.

CHAIRMAN SAMSON: Now in connection with industry, any opening statement?

MR. BROWN: We prefer to reserve ours, Your Honor.

CHAIRMAN SAMSON: Very well, Mr. Brown.

Do any of the other industries charged in the notice care to make any opening statement or any opening remarks of any kind?

MR. WILCOX: Mr. Chairman, Charles Wilcox representing St. Joseph Light and Power Company and Union Terminal Railroad Company.

CHAIRMAN SAMSON: Mr. Wilcox.

MR. WILCOX: The position of these two companies are identical in this matter and I have been instructed by each one of them to state that it is their position that they are providing no industrial waste which is polluting the Missouri River. The St. Joseph Light and Power Company has, of course, the sewage from about 34 employes in the area that is being spoken of. The Union Terminal Railroad has about 100 employes in this area. And each one of them has authorized me to say that in the future they will be happy to provide a septic system to take care of their own pollution, but they are specifically denying that they are adding any industrial waste to the pollution of the Missouri River.

CHAIRMAN SAMSON: Thank you very much, sir.

Now, what about the other industries that are charged under the notice?

MR. HARRIS: Mr. Chairman.

CHAIRMAN SAMSON: Give the reporter your name and your address, please.

MR. HARRIS: Mr. Christopher Harris with Stratton-Theis Grain Company.

Since we are leasing the facilities which we operate from the Union Terminal Railroad, there was some question in my mind as to whether we should have been mentioned in the proceedings. In the event, however, that that is proper, our position is the same, that we can provide--we only have one small toilet, is all there is to it, and we can provide a septic tank if it becomes necessary.

CHAIRMAN SAMSON: Mr. Harris, do I understand, then are you taking the position that your company should be dismissed out of the proceedings here today?

MR. HARRIS: We did not retain counsel and I am here on my own hook, but since we are I would like to bring out that we are operating these facilities leased from the Union Terminal Railroad so there was a question in my mind as to whether we should be mentioned at all.

CHAIRMAN SAMSON: Then, it will probably resolve itself into a factual situation, isn't that right, Mr. Harris?

MR. HARRIS: Yes. In the event that it is proper, I take the same position, that we can provide the necessary septic facilities.

CHAIRMAN SAMSON: Fine. Thank you very much, Mr. Harris.

MR. BROWN: Mr. Chairman.

CHAIRMAN SAMSON: Yes, Mr. Brown.

MR. BROWN: Since the rest of industry is making some statement, I think it is perhaps more logical that I make our statement at this time.

For you gentlemen's information, there are some 21 industries adjoining South St. Joseph that are outside the city limits. Of those 21 industries at least 10 of them produce practically no waste material whatsoever. Four or five more produce only a minimal amount.

According to the 1955 Black and Veatch Report there are seven industries in that area known as the industrial group, Swift's Armour's, the Stockyards Company, Seitz, Terminal Warehouses, American Cyanamid Company, and Anchor Serum Company, which do introduce into the Missouri River their industrial wastes and sewage. The amount introduced by any one of the industries varies and I wouldn't be prepared to say which one of any of them produces the greater amount.

Now, it is the position of those particular industries that, with all due respect to what the representative of the Government said, between the 1955 Black and Veatch Report and the 1959 Black and Veatch Report there has been material reduction by each and every one of those industries at their own expense and the amount of solids and the amount of waste material and the gallonage that now go into the Missouri River from those industries has been reduced considerably. Those figures will be given to you accurately.

Now, further than that, it is the position of these industries, they are introducing into the river material. If you want to term that pollution in the broad sense, it is pollution at the point where it is introduced. These industries can not say and do not say that that pollution does or does not extend downstream any material distance. They don't say positively one way or the other that it does or does not cause pollution at Atchison, Kansas. We would call the attention of this Board to the fact that any person dealing with water realizes--the gentleman here spoke of odors--odors come from clear waters where algae grows. The prime producer of odors is algae and the Missouri River does contain algae, due to a cleaner stream due to the dams of the Army Engineers. We don't think we are in any way responsible for any odors or anything like that.

Now, so far as remedial projects are concerned, these industries have been and are willing to do whatever is proper in the premises. They have at considerable expense to themselves employed competent engineers and have had surveys made. They have materially reduced their output and are further reducing it, all at their own expense. The St. Joseph Stock Yards Company, as an example, now dry cleans practically all of its pens. Formerly it simply washed it down the sewers. It can go further and dry clean all of the pens.

American Cyanamid has made reductions. All of the plants down there have made reductions.

It has been and is the position of these industries, so there will be no misunderstanding whatsoever, they have felt that a common primary sewerage treatment plant was probably the desirable solution. They have been and are willing to cooperate. But if no one wants to cooperate with these industries they are not only ready and willing, but they will to the best of their ability pursue their own solution of their own particular problems. We don't think the Government has to worry about the industrial area.

CHAIRMAN SAMSON: Thank you, Mr. Brown.

Any other statements now?

Well, with that, in order to facilitate the hearing this morning, I wonder if the Government could get their witnesses together and have them all sworn as nearly as possible while we have the Notary here so that he may be on his way?

MR. STEIN: Yes, sir.

CHAIRMAN SAMSON: Will the Government witnesses kindly step forward.

MR. STEIN: Mr. Hopkins, Mr. Pafford, Mr. Clare, Mr. Walton, Mr. Kittrell, and Mr. Clark.

CHAIRMAN SAMSON: Could the record show, Mr. Ayers, the witnesses who are being sworn, so that it will be clear?

SECRETARY AYERS: Name them again, will you, Murray?

MR. STEIN: Mr. Glen J. Hopkins, Mr. Robert Pafford, Mr. Herbert Clare, Dr. Graham Walton, Mr. Francis W. Kittrell, and Mr. Harold Clark.

(Witnesses sworn.)

CHAIRMAN SAMSON: Now, from the political subdivisions, and I don't mean to restrict you in any way, manner or form, we will have the Notary here for your convenience, but do you have any witnesses you wish to be sworn, from the State of Nebraska or the City of St. Joseph?

MR. SCHOENLAUB: No.

CHAIRMAN SAMSON: How about you, Mr. Brown, do you have any witnesses you care to have sworn at the present time?

MR. BROWN: No.

CHAIRMAN SAMSON: Fine. We will have the Notary here available if you wish to at a later time.

Thank you very much.

You may proceed, Mr. Stein.

MR. STEIN: May we call our first witness, sir?

CHAIRMAN SAMSON: Yes.

MR. STEIN: Mr. Hopkins.

GLEN J. HOPKINS,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. STEIN:

Q. May we have your name and address?

A. Glen J. Hopkins, 2200 Federal Office Building, 911 Walnut Street, Kansas City, Missouri.

Q. You will recall, Mr. Hopkins, that you have been previously sworn and are under oath?

A. Yes.

Q. By whom are you employed?

A. The United States Public Health Service.

Q. What position do you hold?

A. I hold the position of Regional Engineer, Public Health Service Region VI, which comprises seven states headquartered at Kansas City.

Q. How long have you been employed by the Public Health Service?

A. Approximately 16 years.

Q. In what capacity?

A. My present position is that of Regional Engineer. I have held that position for approximately three years. Immediately prior to that I held the position of Officer in Charge, Missouri Drainage Basin Office, of the Public Health Service. Prior to that for approximately three years I held a series of relatively short term assignments administering sanitary engineering programs.

Q. By whom were you previously employed?

A. I was previously employed by the State of Missouri.

Q. In what capacity?

A. As a Sanitary Engineer in the State Health Department of Missouri serving in the capacity of District Public Health Engineer and Assistant Chief State Sanitary Engineer.

Q. How long were you employed in that capacity, in these capacities?

A. Seven years.

Q. Were your duties in this job related to water pollution control?

A. Yes, in all of the assignments I have mentioned.

Q. Have you had any special education or training in the field of sanitary engineering?

A. Yes, I have.

Q. Will you care to relate that for us?

A. I am a graduate Civil Engineer, I have a Master's Degree in sanitary engineering and a Master's Degree in Public Health Administration. I am a licensed professional engineer in the State of Missouri.

Q. What are the duties in general terms of your present position as they relate to water pollution control?

A. I am the representative of the Surgeon General in carrying out field programs of the Public Health Service in sanitary engineering in general and in water pollution in particular.

Q. As part of your duties have you ever inspected the Missouri River in the area of St. Joseph, Missouri.

A. Yes, I have on numerous occasions throughout the last 10 years.

Q. Are you familiar with the water uses in this area?

A. Yes.

Q. Are you generally familiar with the waste discharge system used by St. Joseph, Missouri, and by the industries named in the notice of this hearing?

A. Yes.

Q. Who is the official custodian of the Department of Health, Education and Welfare records pertaining to water pollution control of the Missouri River in the St. Joseph, Missouri, area?

A. As Regional Engineer I am the custodian of those records.

Q. Mr. Hopkins, I direct your attention to a map which purports to be a representation of the Missouri River Basin.

MR. STEIN: I ask that this be marked as Government Exhibit No. 1 for purposes of identification.

SECRETARY AYERS: You have got this one No. 1.

MR. EDELMAN: That is not an exhibit.

MR. STEIN: No, that is not an exhibit, sir.

MR. EDELMAN: That is part of the record.

SECRETARY AYERS: All right.

(Government Exhibit No. 1 marked for identification.)

Q. (By Mr. Stein.) Does this map come from your official records?

A. Yes, it does.

Q. On the basis of your knowledge of the area, is it an accurate representation of the Missouri River Basin?

A. Yes, sir.

Q. By whom was this map prepared?

A. The map was prepared by the Missouri River Division, Corps of Engineers, Omaha, Nebraska.

Q. Will you describe that map in general terms?

A. The map outlines the boundaries of the Missouri Drainage Basin. It gives the state lines. It outlines the Missouri River and its major tributaries, showing their confluence with the Missouri River and the confluence of the Missouri River with the Mississippi River at St. Louis. It shows the reservoir system that has been constructed on the Missouri River and the sections of the Missouri River that have been subjected to channel improvements by the Corps of Engineers.

Q. Thank you, Mr. Hopkins. That is sufficient.

MR. STEIN: I offer this map as Government Exhibit No. 1.

MR. BROWN: I have no objection.

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: Proceed.

(Government's Exhibit No. 1 received in evidence.)

Q. (By Mr. Stein.) Mr. Hopkins, I call your attention to a map right behind you purporting to describe the Missouri River from above St. Joseph, Missouri, to below the Kansas Cities area.

MR. STEIN: And I ask that this map be marked as Government Exhibit No. 2 for purposes of identification.

(Government's Exhibit No. 2 marked for identification.)

Q. (By Mr. Stein.) Is this map part of your official records?

A. Yes.

Q. By whom was this map prepared?

A. This map was prepared by the U. S. Geological Survey.

Q. Would you in general terms describe this map?

A. This map shows the eastern part of the State of Kansas, the western part of the State of Missouri for that portion immediately above St. Joseph to some distance below Kansas City. It shows the Missouri River and its location with respect to the two states and cities in that reach of the river.

MR. STEIN: I offer this map as Government Exhibit No. 2.

MR. BROWN: No objection.

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 2 received in evidence.)

Q. (By Mr. Stein.) Mr. Hopkins, as part of your particular duties, have engineering reports dealing with St. Joseph, Missouri's waste disposal problems been submitted to you?

A. Yes.

Q. Do you have such engineering reports as part of your official records?

A. Yes, I do.

Q. Did you at my request bring those with you today?

A. Yes, I did.

Q. Will you hand me the earliest one of those, Mr. Hopkins?

MR. STEIN: This report is entitled "Report on Long Range Sewerage Plan, St. Joseph, Missouri," prepared by Black and Veatch, consulting engineers, Kansas City, Missouri, and is dated 1953. I ask that this be marked as Government Exhibit No. 3 for purposes of identification.

(Government's Exhibit No. 3 marked for identification.)

Q. (By Mr. Stein.) Would you briefly describe what is contained in this report, Mr. Hopkins?

A. This is a report prepared by consulting engineers engaged by the City of St. Joseph. It outlined the problem of the internal sewer system within the City and recommends a plan of improvements to meet deficiencies. It was prepared and submitted to the Missouri Division of Health in conformancy with regulations of that department and copies were made available to the Public Health Service as a part of the normal working relationship between the State Health Department and the Public Health Service.

MR. STEIN: I offer this as Government Exhibit No. 3.

MR. BROWN: Mr. Chairman, I have just asked the Counsel for the Government, there are three Black and Veatch Reports, '53, '55 and '59, if he will introduce all three I have no objection. If he only introduces the first one, which obviously is outdated, I do object. He assures me he will introduce all three. So my objection is made tentative to his failure to do that. If he doesn't fail, my objection is withdrawn.

CHAIRMAN SAMSON: Subject to those remarks it will therefore be received.

MR. STEIN: Do you want to see this?

MR. SCHOENLAUB: No.

(Government's Exhibit No. 3 received in evidence.)

Q. (By Mr. Stein.) Will you let me have the next report in chronological order, Mr. Hopkins?

MR. STEIN: The title of this report is "Supplemental Sewerage Report, St. Joseph, Missouri", prepared by Black and Veatch, consulting engineers, Kansas City, Missouri, dated 1955. I ask that this report be marked as Government Exhibit No. 4 for purposes of identification.

(Government's Exhibit No. 4 marked for identification.)

Q. (By Mr. Stein.) Mr. Hopkins, will you briefly describe the contents of that report?

A. The 1955 report is supplemental to the 1953 report and investigations and reports on the matter of treatment of the wastes from the City of St. Joseph and industries adjacent thereto. It recommends a plan of improvement. It includes cost estimates. It was received by the Public Health Service from the Division of Health of Missouri as a part of our normal working relationships in matters pertaining to water pollution control activities.

MR. STEIN: I offer this as Government Exhibit No. 4.

CHAIRMAN SAMSON: Mr. Brown, Mr. Schoenlaub, have you seen the copies of it?

MR. BROWN: Yes, I know about it.

CHAIRMAN SAMSON: Very well.

(Government's Exhibit No. 4 received in evidence.)

Q. (By Mr. Stein.) May I have the next report, Mr. Hopkins, in terms of chronological order.

MR. STEIN: This report is entitled "Stock Yards Waste Study, St. Joseph, Missouri", prepared by Black and Veatch, consulting engineers, Kansas City, Missouri, dated 1959. I ask that this be marked as Government Exhibit No. 5 for purposes of identification.

(Government's Exhibit No. 5 marked for identification.)

Q. (By Mr. Stein.) Will you briefly describe the contents of this report, Mr. Hopkins?

A. The 1959 report is a report of consulting engineers engaged by industrial interests giving further study to the nature and extent of wastes discharged by the industries and provides information relative to the responsibility of individual industries within the over-all area.

MR. STEIN: I offer this report as Government Exhibit No. 5.

CHAIRMAN SAMSON: Have you presented it to the gentlemen?

MR. STEIN: Yes, I have.

MR. SCHOENLAUB: Yes.

MR. BROWN: Yes.

CHAIRMAN SAMSON: Any objections?

MR. SCHOENLAUB: No objection.

MR. BROWN: No objection.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 5 received in evidence.)

Q. (By Mr. Stein.) Mr. Hopkins, may I call your attention to Section 2 of the Federal Water Pollution Control Act dealing with the preparation and development of comprehensive programs, Section 4(b) of that Act dealing with surveys and studies to be made by the Public Health Service on request of the state, and Section 8 of that Act dealing with interstate enforcement. Now, under the authorizations of these sections, and similar sections in previous acts, and in carrying out your duties have you personally been involved in official activities concerning abatement of pollution in the St. Joseph, Missouri, area?

A. Yes, I have.

Q. Will you on the basis of such personal participation and your official records outline the activities of the Public Health Service in this regard?

A. The first Water Pollution Act of the Federal Government charged the Public Health Service with the responsibility of working with official state water pollution control agencies in the conduct of studies and investigations relating to water pollution. That law was passed in the late 40's and an office for that purpose was opened in Kansas City in 1948.

In the ensuing years the Public Health Service worked closely with the State Health Departments of the respective states in studying the various rivers of the area and in developing factual reports of sources of wastes, pollution discharges, water uses, water quality objectives, and treatment measures required. Those studies were reported in various reports as joint publications of the Public Health Service and the state water pollution control agencies concerned.

After the release and distribution of those reports the Public Health Service, through my office in Kansas City, has continued to work with the state water pollution control agencies in the implementation of the programs outlined and recommended in the several publications.

Q. Do you have copies of the reports you have prepared?

A. Yes, as they relate to the St. Joseph area I have those reports.

Q. Will you give me the earliest one in terms of chronological order?

MR. STEIN: This report is entitled "Lower Missouri River Basin Water Pollution Investigation, a Cooperative State-Federal Report on Water Pollution," dated October 1952, and it is issued by the Iowa Department of Health, Missouri Division of Health, Kansas Board of Health, Nebraska Department of Health, Minnesota Department of Health, South Dakota Department of Health, and the Public Health Service which was then in the Federal Security Agency. I ask that this report be marked as Government Exhibit No. 6 for purposes of identification.

(Government's Exhibit No. 6 marked for identification.)

Q. (By Mr. Stein.) Can you very briefly tell us about that report, with particular reference to the St. Joseph area?

A. This report covers an investigation of the Lower Missouri River from the vicinity of Yankton, South Dakota, to the confluence of the Mississippi and Missouri Rivers near St. Louis. It was undertaken jointly by the Public Health Service and the states named as coauthors. It outlines sources of pollution in that section of the Missouri Basin, outlines water uses, water quality objectives, indicates projects needed to abate pollution, and contains a considerable amount of laboratory data included in the study.

Q. Is this report part of your official records?

A. It is.

Q. Is it an official Government publication?

A. It is.

MR. STEIN: I offer this as Government Exhibit No. 6.

MR. BROWN: We object to the exhibit. We have never seen it. It numbers some 150 pages; it would take too long to examine it. It is made ex parte and we object to it as not binding on my defendants.

MR. SCHOENLAUB: With the further objection until such time as we have an opportunity to examine the persons who compiled the report.

CHAIRMAN SAMSON: Mr. Stein, does Counsel have copies of that exhibit?

MR. STEIN: No, they do not.

MR. BROWN: It is the first time I have ever seen it.

MR. SCHOENLAUB: I have never seen it before and I have no information--

CHAIRMAN SAMSON: I realize there is probably a wealth of material in that and I also realize that they can't be expected to go through it here in the next 10 or 15 minutes. I mean just looking at it from here I can see it is quite a volume.

I think that subject to their objection, however, I am going to let it go in, subject to the objection of counsel.

(Government's Exhibit No. 6 received in evidence.)

CHAIRMAN SAMSON: Would you kindly, if possible, furnish counsel with a copy of it?

MR. STEIN: Yes, we will. I would like to make a possible correction for the record.

Q. (By Mr. Stein.) Was a copy of this report ever given to the City of St. Joseph, Mr. Hopkins?

A. Copies of this report were distributed in 1952 to each city named in the report and to the major industries included in the report. Those copies were mailed by the State Water Pollution Control Agency having jurisdiction and my office at the time--

MR. SCHOENLAUB: Your Honor, again I object at this time to any statements the witness has to make concerning actions of other people unless the work was done under his direct supervision and control.

A. The agreement by which the study was undertaken--

MR. SCHOENLAUB: Are you going to make a ruling on the objection?

CHAIRMAN SAMSON: I will overrule the objection.

You may proceed.

A. The agreement under which the study was taken as signed by the cooperating agencies covered the matter of distribution of the report and my office investigated--

MR. SCHOENLAUB: Your Honor, again I object to his testimony concerning any agreements that were signed unless those agreements are presented by the witness's evidence.

A. They are included in the report.

CHAIRMAN SAMSON: Mr. Hopkins, do you have a personal knowledge of those agreements, of your own personal knowledge?

A. Yes, sir.

CHAIRMAN SAMSON: I believe he is qualified to answer, Mr. Schoenlaub.

MR. SCHOENLAUB: It still remains that the written agreements would be the best evidence under the circumstances.

Q. (By Mr. Stein.) Mr. Hopkins, I call your attention to Government Exhibit No. 6 and ask if you can find a copy of that agreement in that exhibit?

A. It will take me just a minute, but I will find it.

The agreement covering the report is reproduced with signatures on pages 117 through 120 of the report.

MR. SCHOENLAUB: Is that an executed copy of the agreement?

A. It is a reproduced copy of signed copies.

Q. (By Mr. Stein.) Mr. Hopkins, has as a result of the work you have just outlined any other report been prepared?

A. Yes, there has.

Q. May I have a copy of that report?

MR. STEIN: This report is entitled "A Comprehensive Program for Control of Water Pollution, Missouri Drainage Basin, A Cooperative State-Federal Report on Water Pollution," dated July 1953. The cooperating agencies were the Colorado Department of Public Health, the Iowa Department of Health, the Kansas Board of Health, the Minnesota Department of Health, the Missouri Division of Health, Montana Board of Health, Nebraska Department of Health, North Dakota Department of Health, South Dakota Department of Health, Wyoming Department of Public Health, and the Public Health Service of the United States Department of Health, Education and Welfare. I ask that this be marked for purposes of identification as Government Exhibit No. 7.

(Government's Exhibit No. 7 marked for identification.)

Q. (By Mr. Stein.) Mr. Hopkins, are you familiar with Section 2 of the Federal Water Pollution Control Act dealing with comprehensive programs?

A. Yes.

Q. Under that Act is the Surgeon General required by law to prepare or develop comprehensive programs?

A. He is.

Q. Has such a comprehensive program been prepared for the Missouri Drainage Basin?

A. It has.

Q. Do the contents of this book constitute such a comprehensive program?

A. They do.

MR. STEIN: I call the Board's attention to the regulations governing these hearings and I think the Board can take judicial notice of this document.

MR. BROWN: For the record, Your Honor, we object to this. The reasons are too numerous, I think if you are an attorney, to mention. But I object to it to save our record. I have never seen it. So far as I know we have no copy of it.

MR. SCHOENLAUB: Do you know of your own knowledge, Mr. Hopkins, whether or not a copy of this was furnished to the City of St. Joseph and the other municipalities and industrial interests affected?

A. I do so know.

MR. SCHOENLAUB: Of your own personal knowledge?

A. Yes, sir.

MR. SCHOENLAUB: At what time?

A. Shortly after its release in 1953.

MR. SCHOENLAUB: They were delivered by you?

A. They were not.

MR. SCHOENLAUB: We make the same objections as to this exhibit, Your Honor, as to the last one.

CHAIRMAN SAMSON: Well, subject to those objections, it will be received.

(Government's Exhibit No. 7 received in evidence.)

Q. (By Mr. Stein.) As official custodian of the records of the Department of Health, Education and Welfare do you have copies of letters calling the conference referred to in the notice of this hearing by the Surgeon General?

A. I do.

Q. How were these letters served on the conferees?

A. These letters were addressed to the state water pollution control agencies. They were transmitted by Registered mail with return receipt requested, and there is attached to my copy of the letter the receipts of such mailing.

Q. To whom were these letters addressed?

A. To Dr. Hardwicke, as Acting Director of the Division of Health of Missouri, and to Dr. Thomas B. Hood, Executive Secretary of the Kansas State Board of Health.

MR. STEIN: I ask that these letters of notification of the conference be marked as Government Exhibit No. 8 for purposes of identification, the letter to Kansas marked as Exhibit 8(A) and the letter to Missouri marked as 8(B), both letters to be treated as one exhibit.

SECRETARY AYERS: Say them again?

MR. STEIN: Kansas 8(A), Missouri 8(B).

(Government's Exhibit 8, (A) and (B), marked for identification.)

Q. (By Mr. Stein.) For what do these letters indicate the conference was called, Mr. Hopkins?

A. The conference is indicated as called on June 11, 1957, at 10 a.m.

Q. For what city?

A. St. Joseph, Missouri.

MR. STEIN: I offer these as Government Exhibit No. 8, 8(A) and 8 (B).

MR. BROWN: I have no objection to the letters in so far as they purport to give notice. I do object to the contents of the letters wherein they express the personal ideas of the individual writing the letter. If they are introduced solely for the purpose of showing notice, I have no objection.

MR. SCHOENLAUB: Were these exhibits prepared by you, Mr. Hopkins?

A. The letters were not prepared by me. They are signed by the Surgeon General.

MR. SCHOENLAUB: Did you do the mailing of the letters?

A. I did not.

MR. SCHOENLAUB: Did you supervise the handling of them and the mailing?

A. I don't supervise the Surgeon General's actions, no, sir.

MR. SCHOENLAUB: Did you attach the postal receipt?

A. I observed their attachment.

MR. SCHOENLAUB: But you did not--you of your own personal knowledge don't know whether these are the letters that were referred to in the notice for the receipt from the Postal Department or not?

A. I do so know.

MR. SCHOENLAUB: You saw them mailed?

A. No, sir, I did not.

MR. SCHOENLAUB: Your Honor, we object again to the introduction of those exhibits on the basis that no proper foundation has been laid for them, Mr. Hopkins has no knowledge personally of their contents or the method in which they were served on the parties.

CHAIRMAN SAMSON: Now, in connection with Mr. Schoenlaub's objection, it is overruled.

In connection with Mr. Brown's, let me ask you, Mr. Stein, the purpose of the letter. Is it to establish notice?

MR. STEIN: Just to establish notice. I might call to the Board's attention that under the Statute the Surgeon General has to come to certain conclusions as to the probable existence of pollution before he can issue a letter calling a conference of this sort. However, we are just introducing them at this time to show service of the notice.

CHAIRMAN SAMSON: With that explanation, Mr. Brown, do you still have an objection?

MR. BROWN: As long as that is the sole purpose I have no objection.

CHAIRMAN SAMSON: Fine. Very well, they will be received.

(Government's Exhibit No. 8, (A) and (B), received in evidence.)

CHAIRMAN SAMSON: Gentlemen, I believe at this time, we have been laboring here for about an hour and a half, and it might be well to take about a 15-minute recess.

(RECESS)

CHAIRMAN SAMSON: The Board will come to order.

Will you proceed, Mr. Stein, please.

Q. (By Mr. Stein.) Mr. Hopkins, was this conference called by the Surgeon General in fact held?

A. It was.

Q. Were you present at the conference?

A. I was, as a conferee--

Q. Did you participate in the conference?

A. I represented the Public Health Service as their conferee.

MR. BROWN: Mr. Chairman, we will stipulate that the conference was called and held.

CHAIRMAN SAMSON: Very well, sir. Possibly that will facilitate matters.

MR. STEIN: Will the City so stipulate?

MR. SCHOENLAUB: Yes.

Q. (By Mr. Stein.) Was a summary of the conference as required by law prepared?

A. It was.

Q. Do you have a copy of that summary?

A. I do.

MR. STEIN: I ask that this be marked as Government Exhibit No. 9 for purposes of identification.

(Government's Exhibit No. 9 marked for identification.)

Q. (By Mr. Stein.) Is such a summary required to be prepared by the provisions of the Federal Water Pollution Control Act, Mr. Hopkins?

A. The law so requires.

MR. STEIN: I offer the summary of the conference held at St. Joseph under the Federal Water Pollution Control Act as Government Exhibit No. 9.

MR. BROWN: Your Honor, we tried to shorten this. We stipulated the conference was called and held. I object to what it says. That is not binding on these parties. I don't think there is any necessity of introducing it now since we stipulated.

CHAIRMAN SAMSON: Subject to that objection we will receive it in evidence.

(Government's Exhibit No. 9 received in evidence.)

Q. (By Mr. Stein.) Will you read the major conclusions and recommendations of the conferees?

A. The conferees unanimously made the following conclusions and recommendations:

"1. That pollution of interstate waters subject to abatement under the Federal Water Pollution Control Act is occurring in the Missouri River--St. Joseph, Missouri area (Missouri-Kansas). Sewage and industrial wastes from St. Joseph, Missouri, and its associated stockyard district in Missouri are finding their way into the waters of the Missouri River, an interstate water as defined by the Federal Act. Such discharges cause pollution of the Missouri River so as to endanger the health and welfare of persons in Kansas, a State other than that in which the discharges originate.

"2. That the effects of this pollution are: (1) deterioration of water quality for public water supply of Atchison, Leavenworth and Kansas City, Kansas, with associated enhancement of possible disease transmission; (2) increased concentrations of coliform and other organisms associated with human diseases which constitute a health hazard to commercial and recreational users of the river; (3) deterioration of water quality so as to interfere with its use for stock watering; (4) deterioration of water quality so as to prevent full use of the commercial fishery of the Missouri River below St. Joseph, Missouri; (5) deterioration of water quality so as to create conditions inimical to fish and wildlife in the area; and (6) impairment of water quality for many industrial uses.

"3. That measures presently used for the disposal of sewage and industrial wastes from St. Joseph, Missouri, and its associated stockyard district are not adequate to secure abatement of pollution of the interstate waters of the Missouri River.

"4. That the delays encountered in abatement of such pollution are due to lack of installation of adequate waste treatment facilities or other methods for reduction of pollution by St. Joseph, Missouri, and the industries concerned. These industries consist of American Cyanamid (Lederle Laboratories), Armour & Company, Swift & Company, Terminal Warehouse, St. Joseph Stock Yards Company, Seitz Packing Company and Consumers Cooperative Association.

"5. That cognizance is taken of the fact that the practice of dumping municipal garbage and refuse and stockyards' wastes including paunch manure, stock manure, and bedding wastes into the Missouri River has recently been discontinued; and that these practices will not be resumed.

"6. That the City of St. Joseph, Missouri, and the industries of its associated stockyard district provide adequate treatment of wastes prior to their discharge.

"7. That detailed plans and specifications for facilities to treat these wastes be completed by June 30, 1958.

"8. That contract awards for construction of these facilities be made by January 1, 1959.

"9. That the City of St. Joseph, Missouri, submit the financing of the City's proposed waste treatment facility to its voters on November 12, 1957.

"10. That cognizance is taken of the fact that the City officials of St. Joseph have proposed a treatment facility which would collect and treat industrial wastes from its associated stockyard area as well as wastes from within its municipal limits; that the City should have an answer as to whether the industries in the stockyard area wish to join with the City in such treatment facilities by September 1, 1957; that if the City does not get an affirmative answer by this date, the City would be justified in assuming that the stockyard group of industries did not wish to join with the City and should then proceed to present its financing plan to its voters on November 12, 1957, based on a waste treatment facility designed to handle waste from within the City limits of St. Joseph.

"11. That the Missouri Division of Health report to the conferees periodically as to progress. The first report will be made after September 1, 1957; the second report after November 12, 1957; the third report after June 30, 1958; and the fourth report after July 1, 1959. Additional reports will be made if appropriate."

MR. STEIN: If Counsel for the industries and the City will stipulate that this summary was mailed to the conferees, that is the State Health Departments of Missouri and Kansas, we merely offer the letters sending these as Government Exhibit No. 10 (A) and (B), 10(A) for Kansas, 10(B) for Missouri.

MR. BROWN: If you say it went to the States I will so stipulate, to save time and trouble.

MR. SCHOENLAUB: I will stipulate that part.

MR. STEIN: All right. I offer these as Government's Exhibit 10(A) and 10(B).

(Government's Exhibit 10(A) and 10(B) marked for identification.)

CHAIRMAN SAMSON: Mr. Stein, what is 10(A) and 10(B)?

MR. STEIN: These are letters transmitting the summary of the conference to the States as required by law and is evidenced by signed returned receipts.

CHAIRMAN SAMSON: Thank you.

MR. SCHOENLAUB: We will stipulate the transmission to these authorities, Your Honor, but we won't stipulate--we object to any contents of the letters other than just the formal words of transmission.

CHAIRMAN SAMSON: Thank you.

(Government's Exhibits 10(A) and 10(B) received in evidence.)

Q. (By Mr. Stein.) Mr. Hopkins, may I call your attention to Section 8 of the Act which provides that at the conclusion of the conference the Surgeon General may recommend to the State concerned that it take remedial action to carry out the recommendations of the conferees?

A. Yes, sir.

Q. Has such a recommendation been made in the case of St. Joseph and the industries?

A. It has.

Q. How was this done?

A. A letter from the Surgeon General to Dr. H. M. Hardwicke, Acting Director, Division of Health of Missouri, under date of December 9, 1957, transmitted by Registered mail with return receipt requested and attached hereto.

MR. STEIN: May I ask that this be marked as Government Exhibit No. 11 for purposes of identification.

(Government's Exhibit No. 11 marked for identification.)

Q. (By Mr. Stein.) Will you read the pertinent portion of this letter, Mr. Hopkins?

MR. SCHOENLAUB: Your Honor, I object to any testimony concerning the exhibit until it has properly been introduced in evidence.

CHAIRMAN SAMSON: I will sustain that objection.

MR. SCHOENLAUB: Again, Mr. Hopkins, where did this exhibit come from?

A. That is from my official files. My official copy of an official letter from the Surgeon General to the State Health Agency.

MR. SCHOENLAUB: Where does the postal receipt come from?

A. From the Surgeon General's office submitted to me for my official file.

MR. SCHOENLAUB: And you attached the notice to your letter?

A. Yes.

MR. SCHOENLAUB: Your Honor, again I object to the introduction of evidence of this type until a proper foundation has been laid.

CHAIRMAN SAMSON: May I see the exhibit, Mr. Stein, please?

MR. STEIN: Yes.

MR. SCHOENLAUB: There is no assurance, nor can this witness testify, that the postal receipt is for the same matter which it is attached to. He is familiar neither with the contents of the letter, the method in which it was transmitted, nor the transmittal itself.

CHAIRMAN SAMSON: I realize there might be a close question here on foundation. However, I can well see that-- Is there any question that this letter was delivered to Dr. Hardwicke?

MR. SCHOENLAUB: It hasn't been proven that the letter was delivered to Dr. Hardwicke.

CHAIRMAN SAMSON: Dr. Hardwicke, where is he located?

Q. (By Mr. Stein.) Kansas?

A. Jefferson City, Missouri.

CHAIRMAN SAMSON: Who is he with down there?

A. He is Acting Director of the Division of Health of Missouri.

CHAIRMAN SAMSON: Mr. Hopkins, do you know of your own personal knowledge that he did receive this letter?

A. I do.

CHAIRMAN SAMSON: Did you have some discussion with him about it?

A. I had conference with him in his office, we and his staff, regarding the receipt of this letter.

CHAIRMAN SAMSON: And about when was that, if you recall?

A. Approximately two to two and a half years ago. I don't remember the exact date.

CHAIRMAN SAMSON: I believe that with those remarks I will have to let this letter in. I realize that you have, generally speaking, a good objection, but in this administrative hearing where we are not bound by the strict rules of evidence, for whatever weight this item has we will consider it and I will receive it.

MR. BROWN: Our only objection, Mr. Chairman, is to the contents. We will stipulate that a letter was sent by the Surgeon General, since Mr. Hopkins said Dr. Hardwicke said he got it. I know Dr. Hardwicke and I am sure he did. But I don't think the contents are binding on these defendants and we object to the contents.

CHAIRMAN SAMSON: Well, with that objection in mind, Mr. Brown, your objection is overruled.

(Government's Exhibit No. 11 received in evidence.)

Q. (By Mr. Stein.) Mr. Hopkins, I would like to call your attention to Government Exhibit No. 11 and ask you to read the pertinent part of the letter.

A. I believe the pertinent part is the last paragraph, and I will read:

"In view of this development it is believed that effective progress toward abatement of pollution of the Missouri River in the St. Joseph, Missouri area is not being made. Further, as unanimously concluded by the conferees, it is believed that the health and welfare of persons in States other than Missouri, from which the discharge emanates, are being endangered by pollution of interstate waters contributed to by discharges of wastes from St. Joseph. It is recommended that your department take appropriate steps under the State Water Pollution Control program to insure that St. Joseph, Missouri arranges for submitting the question of financing its remedial work to its voters at the earliest opportunity and also meets the other points of the time schedule unanimously agreed upon by the conferees."

Signed Dr. L. E. Burney, Surgeon General.

MR. SCHOENLAUB: What is the date on that letter?

CHAIRMAN SAMSON: I have 12-9-57.

A. December 9, 1957.

MR. SCHOENLAUB: And how long ago did you talk to Dr. Hardwicke about it, two and a half years ago?

A. Approximately two to two and a half years ago, I believe I said.

MR. SCHOENLAUB: What is this date?

A. Sir?

MR. BROWN: 7-27.

MR. STEIN: Do you wish to cross-examine now, Mr. Schoenlaub?

MR. SCHOENLAUB: No, I just wanted to ask a point of clarification on the exhibit.

MR. STEIN: All right.

Q. (By Mr. Stein.) Mr. Hopkins, in your dealing with this problem can you describe the water uses of the Missouri River in this area?

A. Yes, I can.

Q. Would you want to do that, using any of the exhibits you may wish? Identify the exhibit you are using.

A. I believe Government Exhibit No. 1 would best reflect these water uses. St. Joseph is approximately this point (indicating) on the map. In my opinion, the principal use of waters of the Missouri River are for use as municipal water supplies by the Cities of Atchison, Kansas, about 24 river miles downstream, by Leavenworth, Kansas, approximately 20 to 25 further downstream, and by Kansas City, Kansas, about the same distance downstream from Leavenworth.

This part of the Missouri River has been stabilized. The channel has been stabilized and the flow is regulated for navigation, and navigation is in active process between St. Louis and Omaha, Nebraska.

The waters of the Missouri River below St. Joseph, between St. Joseph and Kansas City, Kansas, are used extensively for recreation, pleasure fishing, pleasure boating, water skiing, some hunting for waterfowl, some commercial fishing does exist, and some use is made of the river for watering of livestock. In addition industries in the communities downstream from St. Joseph depend upon the water as a source of industrial water supply.

Q. Mr. Hopkins, as part of your official duties are you familiar with the treatment needs to meet these water uses in this area?

A. The treatment needs of waters?

Q. The treatment needs of the communities in general terms.

A. Yes.

Q. Have you developed a cooperative program for such treatment needs?

A. Yes, sir.

Q. Can you describe those for us?

A. To implement the carrying out of the Surgeon General's comprehensive program for the Missouri River Basin, as a part of my official duties I called a meeting of the Chief Sanitary Engineers of the five State Health Departments concerned with the Lower Missouri River to consider a uniform program to apply to pollution of the interstate portion of the Missouri River. This meeting was held in Omaha, Nebraska, on September 15, 1953. It was attended by the Chief Engineers of the State Health Departments of South Dakota, Iowa, Nebraska, Kansas, and Missouri.

The meeting September 15, 1953, resulted in an agreement by the five State Health Departments that a uniform program should proceed uniformly throughout the Lower Missouri River. The five State Health Departments agreed that the principal objective of the treatment program would be the improvement of raw water quality for domestic use. Effective removal of settleable and floating solids would be considered the minimum acceptable treatment.

In addition, in the State's review of plans and specifications for waste treatment works, each State would give consideration to programs of waste salvage, improved housekeeping, fine screening, pretreatment, or other control of industrial wastes to insure reasonable reduction of toxic materials, oils, blood, grease, offal, paunch manure and other materials, other objectionable matter, particularly if they would not be effectively removed in a primary treatment process.

Q. Mr. Hopkins, as part of your official duties are you required to keep advised as to whether St. Joseph, Missouri, and industries near that City have taken action to comply with the remedial action as recommended by the conferees as you have described and recommended by the Surgeon General?

A. Yes.

Q. To your knowledge has such action been taken?

A. Abatement of pollution has not been accomplished.

Q. What action, if any, has been taken?

A. Some of the industries have made revisions of their industrial processes or housekeeping provisions to eliminate or reduce some of the discharges that were being made, so that there has been some reduction in waste discharges. A lesser amount of things like blood and grease and paunch manure, in my opinion, are being discharged now than at the time of the conference.

Q. Has a successful bond issue been held by the City of St. Joseph?

A. No, sir.

Q. As part of your official duties, have the official state water pollution agencies of Missouri reported to you on this condition?

A. Yes, they have.

Q. How have they done that?

A. By an official communication addressed to the Regional Office in Kansas City.

Q. May I have a copy of that?

MR. STEIN: I ask that this letter be marked as Government Exhibit No. 12 for purposes of identification.

(Government's Exhibit No. 12 marked for identification.)

Q. (By Mr. Stein.) You just describe to whom this letter was addressed and the date?

A. It is addressed to the Regional Medical Director of the Public Health Service, Attention Regional Engineer, dated March 10, 1959.

Q. Does this letter have an attachment to it?

A. Yes.

MR. STEIN: I ask that that attachment be included as Government Exhibit No. 12.

CHAIRMAN SAMSON: Very well.

Q. (By Mr. Stein.) Is this letter part of your official records?

A. It is.

MR. STEIN: I offer this letter and its attachment as Government Exhibit No. 12.

MR. BROWN: Mr. Chairman, so far as industry is concerned, this has nothing to do with us whatsoever, and we object to it as not having any bearing on any charge against industry. This has to do with the City.

Do you agree on that?

MR. STEIN: Yes. It will speak for itself.

MR. BROWN: Yes.

MR. SCHOENLAUB: We have no objections.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 12 received in evidence.)

MR. BROWN: As against industry? It has nothing to do with industry.

MR. STEIN: I think the contents of the letter will speak for itself and I think that will be so indicated.

MR. BROWN: All right, then.

CHAIRMAN SAMSON: All right.

Q. (By Mr. Stein.) Mr. Hopkins, would you mind reading that letter and designate the attachment, please.

A. The letter is from the Executive Secretary of the Missouri Water Pollution Control Board addressed to Regional Medical Director, Region VI, Attention Regional Engineer.

"Enclosed herewith are two copies of a letter from the Mayor of St. Joseph relative to their sewage works program. Previously, the city of St. Joseph had indicated they would hold a bond election to finance sewage improvements prior to May 31, 1959.

"At the meeting of the Water Pollution Board on March 3, 1959, the progress of the city of St. Joseph in abating pollution was discussed. It was felt that St. Joseph might not keep the time schedule of holding a bond election prior to May 31st. The Board authorized the Executive Secretary to request a hearing as authorized under Public Law 660 in the event St. Joseph did not indicate that they would hold a bond election prior to May 31st.

"Since it is evident that the city of St. Joseph does not plan to hold a bond election prior to May 31st, it is respectfully requested that a hearing in accordance with Public Law 660 be held relative to the pollution contributed by the city of St. Joseph and the stockyards' industries at the earliest possible convenient date."

Signed Jack K. Smith, Executive Secretary.

Q. The attachment?

A. Do you want the attachment read?

Q. Yes, will you describe that? Just describe what the attachment is.

A. The attachment is a Thermo-Fax copy of a letter from the Mayor of St. Joseph to the Missouri Water Pollution Control Board giving three points of information in reply to a letter from the Board dated February 24, 1959.

Q. That letter was received at your office from Mr. Smith of Kansas with that Thermo-Fax copy attached?

A. Mr. Smith of Missouri.

Q. Of Missouri?

A. Yes.

Q. Thank you.

A. Do you want this read?

CHAIRMAN SAMSON: Pardon me, Mr. Stein, but apparently from what I know about this exhibit here, there is nothing in there that involves industry, then, in connection with the remarks that Mr. Brown brought up, isn't that right?

MR. STEIN: That is correct, sir, that involves them directly.

CHAIRMAN SAMSON: I see. Very well.

Q. (By Mr. Stein.) Mr. Hopkins, on the basis of all your extensive knowledge of this area and problem and considering the water uses made of the Missouri River you have outlined before, in your opinion is pollution from St. Joseph, Missouri, and the industries named in the notice of this hearing continuing substantially unabated as they affect these water uses?

A. Yes, it is.

MR. BROWN: Just a moment. Just a moment.

As far as industries are concerned, I object to that unless Mr. Hopkins is requested to take into consideration the vast amount of abatement which has been made by the industries and is evidenced by the 1959 Black and Veatch Reports which the Government has introduced in evidence.

MR. STEIN: Yes. He has already testified as to that. We assume that the foundation for the question is that Mr. Hopkins has taken that and is taking that into consideration in his answer.

Q. (By Mr. Stein.) If you have not, will you consider that now?

A. I have taken that into consideration.

MR. SCHOENLAUB: Your Honor, I object to any testimony along that line as being a conclusion of the witness, the water uses which he is referring to in his testimony being unestablished at this point.

MR. STEIN: I believe Mr. Hopkins is qualified as an expert on this matter.

CHAIRMAN SAMSON: I think this gentleman here is raising a question of foundation, Mr. Stein, and I wondered if you could lay just a little better foundation.

MR. STEIN: Well, if that is the case, we would prefer to have Mr. Hopkins answer this question as to water uses later. We plan to call him as the concluding witness of the main portion of the Government's case and we would withdraw that part of the question as relating to water uses.

Q. (By Mr. Stein.) May I rephrase the question. On the basis of your experience in this matter do you believe that substantial amounts of pollution are coming from St. Joseph, Missouri, and the associated stockyard area and are finding their way into the Missouri River?

MR. SCHOENLAUB: Your Honor, again I object to any testimony concerning this "substantial amount" without defining just what he is referring to, and what he considers "a substantial amount" is no proper testimony.

CHAIRMAN SAMSON: Well, I realize "a substantial amount" is a relative term. Could you clarify that just a little bit, Mr. Stein?

Q. (By Mr. Stein.) Would you clarify what you might consider a substantial amount? Would you consider untreated pollution from a city of 80,000 people coming into a river the size of the Missouri River with its present flow a substantial amount of pollution, Mr. Hopkins?

A. I would consider that very substantial.

MR. SCHOENLAUB: There again, Your Honor, until such time as the amount of pollution and the type of river into which it is being poured is established I object to the answer to that question.

CHAIRMAN SAMSON: I believe I will overrule your objection and let him answer, subject to your objection.

A. I would say a very substantial amount of pollution is being discharged from St. Joseph and associated industries at this time.

MR. BROWN: I ask that be stricken. That is not responsive to the question. The question was was it being distributed from a city of 80,000 people.

CHAIRMAN SAMSON: Sustained.

Q. (By Mr. Stein.) Do you want to answer the question?

A. Could I please have the question repeated? I think there are too many of them here.

Q. Would you consider pollution from a city of 80,000 people being discharged untreated into a river of the size and flow of the Missouri River as it flows past St. Joseph, Missouri, as being a substantial amount of pollution?

A. I would consider the toilet, bathroom, kitchen waste discharges through the homes of 80,000 people to constitute a significant amount of pollution.

Q. Have you been past the discharge points of the industries named in this notice where wastes from such industries go into the Missouri River?

A. I have.

Q. Have you been past those recently?

A. Yes.

Q. On the basis of your experience in water pollution control and as a sanitary engineer, and considering the type of watercourse they flow into, do you consider that a substantial amount of pollution?

A. I do.

MR. STEIN: We have no further questions for Mr. Hopkins at this time. We should like to reserve the right to recall him at the conclusion of the main portion of the Government's presentation.

CHAIRMAN SAMSON: That will be all right.

Now, in connection with cross-examination, let me inquire, any cross-examination by representatives of the States of Kansas or Missouri?

Your other political subdivisions, namely the City of St. Joseph, any cross-examination on behalf of the City of St. Joseph?

MR. SCHOENLAUB: Yes, Your Honor.

CHAIRMAN SAMSON: You may proceed.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. To start off with, Mr. Hopkins, right where you ended, what basis do you use to determine what is or what is not pollution?

A. Studies and investigations made by our staff--

Q. No, I mean what is, in your opinion, the definition of the term pollution?

A. Materials that would interfere with legitimate water uses of the receiving watercourse.

Q. The logs going downstream would constitute pollution?

A. I would presume that if that interferred with a legitimate water use it would constitute pollution. We usually limit our considerations to those discharges through sewer systems or waste outlets.

Q. Has any action been taken to abate the flow of logs and other debris down the Missouri River?

A. Not by the Public Health Service.

Q. But you are charged with abating pollution?

A. Municipal and industrial sources, yes.

Q. In your opinion any discharge of such material would constitute pollution regardless of the quantity?

A. I did not so say. In my opinion that is not true.

Q. How do you arrive at just what is, then, and what is not pollution? Is there a dividing line?

A. There are generally accepted objectives of water quality for specific uses.

Q. What are those objectives and how are they arrived at?

A. For domestic water supply there is a publication of the Public Health Service known as the "Manual of Recommended Water Sanitation Practices" that outlines desirable characteristics of acceptable raw water. It was arrived at after extensive study by a carefully and highly selective group of outstanding sanitary engineers and Public Health authorities representing such organizations as the American Water Works, the American Public Health Association, and others concerned.

Q. Just what, according to this manual you refer to, then, would constitute pollution?

A. There is established in the manual limits for acceptable quality with respect to bacteriological standards and certain toxic substances.

Q. And what are those standards?

A. It is a very lengthy and rather complex statement. Without reference to the manual I would be reluctant to do other than indicate the general levels without some of the limiting considerations that are specified.

MR. SCHOENLAUB: Mr. Stein, will there be witnesses who can testify as to these standards?

MR. STEIN: Yes, there will.

MR. SCHOENLAUB: And qualities?

MR. STEIN: Yes, there will.

Q. (By Mr. Schoenlaub.) In this letter from Dr. Hardwicke, March 10, 1959, the contents of that, he is actually the person who requested this hearing to be called by the Secretary?

A. He did request--I don't believe that the Mar 10th letter was signed by Dr. Hardwicke, was it, '59?

Q. I mean Jack Smith. Excuse me.

A. The Executive Secretary of the Missouri Water Pollution Board did request that a hearing be held. I am not sure of your question. Does that answer it?

Q. Yes. You stated earlier that the industries south of St. Joseph have revised their processes and have reduced the quantity of their discharges, that there is a less amount now than there had been. To what degree has that discharge been reduced?

A. I would be unable to assign a numerical value to the amount reduced or a meaningful percentage.

Q. You testified earlier that the water of the Missouri River is used for recreational purposes, boating, skiing, fishing, hunting, stock watering, industrial uses. Have you observed any of these uses yourself on the Missouri River?

A. Yes, I have.

Q. To what extent is the Missouri River used for those purposes?

A. Would you enumerate the purposes again?

Q. First for boating.

A. There is a considerable amount of boating along the river in its interstate reach between St. Joseph and Kansas City. We have--

Q. Now, in what way do sewage discharges which you have alleged from this area interfere with such boating activities on the Missouri River?

A. It is a very significant potential health hazard to the occupants of the boats.

Q. In what way does it interfere with the boating?

A. Interfere with the boating?

Q. Yes.

A. I would think the health and safety of the occupants would be related to boating.

Q. In what way would it affect the health and welfare of the occupants of the boats?

A. Water laden with pathogenic organisms certainly gains contact with the hands and bodies of persons riding in the boat, exposed to spray, handling of the water, the handling of the boat and motor, and that close contact with the water constitutes a health hazard.

Q. Have you seen anyone water skiing on the Missouri River?

A. Yes, sir.

Q. When?

A. Last summer.

Q. Where?

A. In the vicinity of Atchison, Kansas.

Q. With no interference from the debris that constantly flows through there?

A. I noted none.

Q. You have noted no debris flowing in the Missouri River?

A. I know there is debris in the Missouri River.

Q. But that doesn't--

A. But I said I noted no interference.

Q. Where along the Missouri River is stock watered in the Missouri River?

A. I wouldn't be able to point out the section, range and township, but I would say at one or more points in both Kansas and Missouri downstream from St. Joseph and upstream from Atchison, Kansas.

Q. Approximately where and how many stock farmers water their stock directly in the Missouri River?

A. We have made no census of that information. We have only observed that such does exist.

Q. Where?

A. Downstream from St. Joseph and on the Kansas side of the River.

Q. Approximately where?

A. I believe that other witnesses can answer the exact location better than myself.

Q. In what way does the Missouri River interfere with the hunting of birds and other types of fowl, waterfowl?

A. The sandbars during the migratory bird season are, well, I will say, literally covered with accumulations of grease, slime, feces, and other materials closely identified with sewage that interfere with the use of the bars for hunting. The handling of decoys, and so forth, brings the hunters in close contact with sewage-related materials that they must remove from the weights of their decoys in setting them out and taking them in, that brings them in intimate contact with the polluted water.

MR. SCHOENLAUB: Will you have witnesses to testify as to that Mr. Stein?

MR. STEIN: We think so.

MR. SCHOENLAUB: I have no more questions.

CHAIRMAN SAMSON: Any further cross-examination, Mr. Brown?

MR. BROWN: Yes, I have just a few.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Hopkins, part of your testimony consisted of the '53, '55 and '59 Black and Veatch Reports?

A. Yes, sir.

Q. Black and Veatch, of course, are an independent firm?

A. Yes, sir.

Q. You consider them very capable in this particular field?

A. I so do.

Q. The original report of '53 was at the expense of the City?

A. Yes, sir.

Q. The '55 report, however, contains an additional survey for industry which quite obviously industry paid for?

A. I have no knowledge as to that, but it will certainly be assumed that they did.

Q. And the '59 report was entirely made at the request of industry?

A. Yes, sir.

Q. At their own expense?

A. Yes, sir.

Q. Now, the '59 report showed a material reduction in waste matter discharged by these industries, didn't it?

A. Yes.

Q. The percentage you do not know?

A. I do not have in mind.

Q. Now, going back to the discharge in this area, St. Joseph being located as it is, its sewers discharge into the river before any of that water reaches the stockyards area or the industrial area? All of the city sewers are north of the industrial area?

A. That is right.

Q. There is one sewer at the northern edge of the industrial area, that is right, isn't it?

A. There is a sewer at the northern edge of the industrial area, yes.

Q. And that is the sewer through which these industries discharge into the river?

A. Yes.

Q. That sewer also carries a large volume of discharge from the southern portion of the City?

A. Yes.

Q. Now, you testified on direct examination that there was a substantial discharge in that area. Do you have any possible way of knowing how much of the discharge at the present time is from industry and how much from the City?

A. Yes, I think the answer is yes.

Q. How can you differentiate it when all comes out in the same sewer?

A. From studies of industries and their operations made not only by the consulting engineer and included in the report but by similar studies made by Public Health Service representatives.

Q. Do you have any study made by any of those people subsequent to 1957?

A. Yes.

Q. Which?

A. That will be handled by another witness who has been engaged in those activities.

Q. Well, I am talking about what you know yourself?

A. I know the results of the work of my staff.

Q. No, I am not talking about somebody else's results. I want to know what you know.

A. I have not personally studied.

Q. You testified that from your own observation there was a substantial discharge there in this sewer in which both city and industrial sewage is commingled?

A. Yes, sir.

Q. Factually it is impossible for you to tell how much comes from each one, isn't it?

A. I certainly believe there is enough evidence there to give me a well-founded opinion.

Q. Well, let me give you a little more evidence. Did you know that the St. Joseph Stock Yards in the past year has reduced from its pens alone the organic livestock waste by 14,461 tons that formerly went out that sewer?

A. I have not been so advised of that. I think if you will remember, that I was confident that there had been substantial reduction but not complete abatement of wastes.

Q. All I am trying to point out is that if that has been done, that is a tremendous reduction, isn't it?

A. That is a substantial reduction.

Q. And that would greatly lessen the amount of pollution, if any, that came from that one particular industry?

A. It would lessen it, yes.

Q. Let's take Swift & Company. If I were to tell you that they have reduced their gallonage 483.5 million gallons per year that goes out that sewer, that is a substantial reduction, isn't it?

A. Volume alone does not constitute a reduction. It may be in less dilution water.

Q. Well, if you are going to have a treatment plant it certainly lessens the amount of material or water that must be treated in that plant?

A. It lessens the volume of the wastes, yes.

Q. To be accurate, then, to determine the present amount of pollution from the industries, there should be some accurate method of determining how much comes out that one sewer from industry and from the City, shouldn't there?

A. Well, I think the obvious answer to your question is yes, there should be some division or allocation of responsibility.

Q. And you yourself can't give us that division?

A. I did not say that I could.

Q. That is all I want to bring out.

A. Yes, sir.

MR. BROWN: Thank you very much.

MR. SCHOENLAUB: If I may, I have one more question.

CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Hopkins, have you observed any decrease in the use of the Missouri River for any of the purposes you mentioned due to the alleged pollution?

A. I have observed no decreases.

MR. SCHOENLAUB: I have no more questions.

CHAIRMAN SAMSON: Any further cross-examination by any other member of industry or any other political subdivision?

There being none, how about the members of the Board? Any questions?

Mr. Poole?

MR. POOLE: No, sir.

CHAIRMAN SAMSON: Walter?

MR. KURYLO: I have a few questions merely to clarify my understanding of Mr. Hopkins' testimony.

Q. (By Mr. Kurylo.) I refer specifically to your testimony with respect to Government Exhibit No. 11, a letter from the Surgeon General dated December 9, 1957.

MR. KURYLO: Would the Secretary show that exhibit to the witness?

Q. (By Mr. Kurylo.) In discussing that exhibit on direct examination, I think it was with respect to some questions arising by Counsel for the City, you indicated that you had discussed that letter with its recipient about two and a half years ago?

A. I believe I said that, yes.

Q. Would you care to comment further on that one point at this time?

A. I would appreciate an opportunity to say my mathematics was poor. The conference was shortly after the letter was issued by the Surgeon General and received by the Division of Health. It was in the same month, so instead of two to two and a half years ago it was about one and a half years ago.

Q. Another point, and this is with respect to Government Exhibit No. 12. There was a question and an objection made by Counsel for the industry, and it is not yet clear in my mind whether that letter of March 10, 1959, applies merely to the City or does it also extend to industry? This is with respect to the request for this hearing.

A. The request for the hearing, I will read that part of it: "a hearing in accordance with Public Law 660 be held relative to the pollution contributed by the City of St. Joseph and the stockyards industries at the earliest possible convenient date." It designates both.

MR. KURYLO: I have no further questions.

CHAIRMAN SAMSON: I have just one short question or two.

Q. (By Chairman Samson.) Mr. Hopkins, what was the date of the conference that your department had with the City of St. Joseph?

A. I believe it was June 11, 1957.

Q. And the acting members of the City Council at that time, are they the same members as you have presently now?

A. I am sure that there has been a change in Mayor and in one or more positions of the City Council. I am not able to say at the moment how many Council positions have changed.

Q. Now, was there at some time, then, after June 11, 1957, the matter of a bond issue submitted to the voters of the citizens of the City of St. Joseph?

A. Yes, such a bond issue was held.

Q. And what was the date of that bond issue?

A. The bond issue was on March 4, 1958.

Q. And what happened when that was submitted to the voters of the City of St. Joseph?

A. My records indicate that 7,826 voted for the proposition and 7,218 voted against it. While it was a majority, it was slightly less than the four-sevenths majority stipulated by State law.

Q. And what was the size of that bond issue in dollars and cents?

A. I will have to check to get that exactly. It covered interceptor sewers, sewage treatment, and in addition extension of a sewer system within the City and sewers for an area to be planned for annexation. The total amount of the bond issue was $9,150,000, of which $5,950,000 was for interceptor sewers, pumping stations and sewage treatment, and that figure included the amount to be paid by industries outside the City.

Q. Was the matter submitted to the voters of the people involving general obligation bonds or revenue bonds?

A. I believe it was a revenue bond proposal.

Q. And on what basis, then, were they to be paid, on the basis of a sewer use fee?

A. A charge based upon water bills of those connected to and using the sewers.

CHAIRMAN SAMSON: I have no further questions. Does any member of the Board have any questions?

Any further cross-examination?

MR. BROWN: No.

MR. SCHOENLAUB: No, Your Honor.

MR. KURYLO: If the witness can at this time, I have some questions based on your examination, sir.

Q. (By Mr. Kurylo.) Do you know what the present sewer fee is in this City?

A. No, I do not.

Q. Do you know from your official knowledge how many users there are of the sewer system per family or per residence?

A. I don't have that information at my disposal at the moment and the figure escapes me.

CHAIRMAN SAMSON: Possibly that will be developed in the Black & Veatch Reports.

If there is nothing further, you may proceed, Mr. Stein.

MR. STEIN: We would like to ask Mr. Hopkins one or two more on redirect, if we may.

## REDIRECT EXAMINATION

BY MR. STEIN:

Q. Mr. Hopkins, I call your attention to Section 12(2) of the Federal Water Pollution Control Act. And I ask the Board to take judicial notice of this. It says: "This Act"--that is the Federal Water Pollution Control Act--"shall not be construed as superseding or limiting the functions, under any other law, or affecting or impairing the provisions of Sections 13 through 17 of the Act entitled, 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors and for other purposes', approved March 3, 1899, as amended."

Now, are you familiar with the program authorized by that Act, commonly known as the Rivers and Harbors Act of 1899?

A. Generally familiar.

Q. Who has jurisdiction of that Act?

A. The Army Corps of Engineers.

Q. Do you know what their jurisdiction is relating to logs and debris coming down the rivers?

A. I could not advise the Board specifically of their responsibilities. I do know that the laws referred to are administered by the Corps of Engineers and not the Public Health Service.

MR. STEIN: I would ask at this point that the Board take judicial notice of this Act which places obstructions with navigation such as debris and logs coming downstreams under the jurisdiction of the Corps of Engineers under this Act, take judicial notice that our Act is not supposed to affect or impair the provisions of this Act.

CHAIRMAN SAMSON: It will be so noted.

Anything further with this witness at the present time?

MR. STEIN: No.

CHAIRMAN SAMSON: You may be excused, Mr. Hopkins.

(Witness excused.)

CHAIRMAN SAMSON: You may proceed, Mr. Stein.

MR. STEIN: Mr. Pafford. Mr. Edelman will ask Mr. Pafford questions.

ROBERT J. PAFFORD, JR.,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Will you identify yourself for the record, Mr. Pafford?

A. My name is Robert J. Pafford, Jr., a practicing professional civil and hydraulic engineer.

Q. I remind you that you were sworn earlier and the testimony you are about to give is still subject to that oath.

A. Yes, sir.

MR. BROWN: Would spell your name, please, sir?

A. P-a-f-f-o-r-d.

Q. (By Mr. Edelman.) By whom are you employed, Mr. Pafford?

A. Employed by the Corps of Army Engineers, Missouri River Division Office, in Omaha, Nebraska.

Q. Will you please describe the functions of your position there?

A. I have two official positions in that office. The first one is as Chief of the Missouri River Reservoir Control Center. In that position I am in charge of and direct the advance planning for and the actual operations of the reservoirs which regulate the flow of the Missouri River and supervisory technical responsibility for functional operation of all other Corps of Engineers' reservoirs in the Missouri Basin.

In my second official position, I am Chief of the Planning and Reports Branch of the Missouri River Division Office in Omaha. In that second position I am in responsible charge of Corps of Engineers' preliminary project planning and project formulation for river basin water control projects in the Missouri Basin for hydraulic engineering planning and design and for related technical and economic activities.

Q. Are you familiar in your two positions with the Corps of Engineers comprehensive flood control program and plan for this area of the Missouri River?

A. I am thoroughly familiar with the comprehensive flood control program and water resources program, as we call it, for the Missouri River Basin. I have been engaged directly in the planning and hydraulic engineering and design and operation of completing the projects in that program since 1942.

Q. Will you please tell us about that program plan as it relates to the regulation of the flow of the Missouri River, with particular reference to the flow at St. Joseph, Missouri?

A. There are many elements in that basin program for water control and development. The most significant by far with respect to the flow of the Missouri River at St. Joseph are large impounding reservoirs on the Missouri River upstream, actually upstream from Sioux City, Iowa, which is upstream from St. Joseph, Missouri. I might say that there are a series that ultimately will consist of six multiple-purpose dams and reservoirs, in Montana, North and South Dakota, and northern Nebraska, that are planned to affect the flow here.

This system of six major reservoirs on the Missouri River was authorized as part of the general comprehensive plan for flood control and other purposes in the Missouri Basin. the authorization being by the Flood Control Act of 1944.

Now, of these six projects I have talked of, four of them are in actual initial operation at the present time, actually controlling the river. Those four are Fort Peck in Montana, Garrison in North Dakota, Fort Randall in South Dakota, and Gavins Point on the Nebraska-South Dakota border. The other two projects are now in construction. That is Oahe Reservoir in South Dakota and Big Bend Reservoir in South Dakota. Oahe extends up into North Dakota also.

These projects will be operated, among other purposes, to control the flow of this reach of the Missouri River, heading through St. Joseph here.

Did you want to know more about the objectives of operation of these also? That is the physical fact of these projects.

Q. That was going to be my next question.

A. Well, pardon me.

Q. What does your long-range plan contemplate with respect to the regulated flow during summer months, with particular reference to what that flow will be in the St. Joseph, Missouri, area?

A. I should elaborate slightly as background so that I am sure everybody understands the flow situation there. These six reservoirs are called multiple-purpose systems and as authorized by law the primary functional purposes for which they are to be operated are flood control, irrigation, navigation, and hydroelectric power. We have actually been operating for those functions since the system came into initial operation in 1954. I might say that we also have a program of planning in advance how to utilize the water for these different functions. There is some degree of competition among use of water for the different functions, so it has to be planned out in advance. So that each year since 1954 advance operating plans have been drawn up to cover the operations specifically and in detail for a year ahead and also longer range. We have programs that extend ahead as far as water uses envisioned by the year 2000 A. D. and later.

Now, all of these plans contemplate a seasonal patterning of releases from the lowermost reservoir, which is Gavins Point on the Nebraska-South Dakota border.

Flows here at St. Joseph, as we have been operating the last four years, since we have had system operation--or the last five years, since 1954--generally contemplate that we will have what is called a navigation season on the river, which normally would be eight months long, extending from late March to late November at St. Joseph, and which has, in fact, been shortened one or two months in each year since we have been operating, because we have had a water shortage condition while we are trying to build up storage in the reservoirs. The discharges that have actually been maintained at St. Joseph, as assured minimum discharges during the navigation season, have fallen within the range of 31,000 cubic feet per second to 35,000 cubic feet per second. I said that was a minimum discharge level that is maintained here. Rainfall on uncontrolled tributaries to the Missouri River which enter the river between the lowermost of these dams I have talked of and St. Joseph will cause the river to have pop rises that may last a day or two or may cause long high water periods that last several weeks, at which time summer discharges are higher than this. They vary as high as, oh, we have experienced up to a peak for a day of 100,000 cubic feet per second, even though we are only operating to assure a minimum flow of, say, 31,000 or 32,000 cubic feet per second. That is during the navigation season of the year.

CHAIRMAN SAMSON: Mr. Edelman, I notice here that it is about three minutes of twelve and I wonder if this wouldn't be a good breaking-off point?

MR. EDELMAN: May I ask the indulgence of the Board and of Counsel? Mr. Pafford is technically on vacation. I think his testimony should not take more than another five or ten minutes at the most. He is sacrificing part of his vacation for this and I know he would certainly appreciate the opportunity of continuing and finishing in the morning.

CHAIRMAN SAMSON: Very well.

MR. BROWN: You find me an engineer who finishes in five minutes and I will stay and listen to it.

CHAIRMAN SAMSON: I had in mind this survey on the river and that is the only reason I thought.

A. I can stay this afternoon.

CHAIRMAN SAMSON: If it is agreeable with parties, we will proceed.

MR. EDELMAN: We will try to expedite this, Mr. Chairman.

CHAIRMAN SAMSON: I don't mean to rush you. You just take your time.

Q. (By Mr. Edelman.) Can you briefly tell us what regulated flow for the nonnavigational months, that is the winter months, is contemplated?

A. Let me start off first with what we have been doing the last five winters. During the nonnavigation winter seasons, discharges here at St. Joseph ordinarily have been maintained within the range of 10,000 cubic feet per second to 15,000 cubic feet per second. However, during very severe cold wave periods when there is ice formation and ice blocking on the river between our reservoirs and St. Joseph, there have been periods of several days at a time from one to three times a winter when the discharges fall much lower than this ten to fifteen thousand second foot level. There are two periods in this that the discharges have fallen below 5,000 cubic feet per second for periods of three to five days.

Now, I should point out that what we have been doing the last four or five years has been providing discharge levels in the wintertime two or three thousand cubic feet per second higher than we will maintain in drought periods in the future. Due to a special situation concerned with power generation at the dams and due to a special water supply problem on the Missouri River below Kansas City our Coordinating Committee, which agrees on these programs before we carry them out in the Reservoir Control Center, has agreed for a short interim period to make these winter discharge levels two or three thousand cubic feet per second higher than they will be in the future.

I should mention one thing for the long-range future about both summer season flows and winter flows. Right now we are in a period where we have been trying to fill new storage in these large reservoirs in the Dakotas and we have had subnormal stream flows. So that has put us into a program of water rationing. As soon as the reservoirs are first filled we will not have that position for a few years. But as another part of this comprehensive program for the Missouri Basin, very large scale irrigation is contemplated in North and South Dakota, Montana and Wyoming, and that soon, within two or three decades, is scheduled to be using water to put us right back in the position where we have found ourselves recently.

In other words, the long range picture for flows, depending on wet years or dry years, is somewhere between 30,000 cubic feet per second and 40,000 cubic feet per second of sustained flows for navigation in the navigation season at St. Joseph, and the winter picture will range from as high in real wet years as 20,000 cubic feet per second average for the winter to as low in real dry years as 7,500 cubic feet per second with this intermittent effect of ice jams superimposed on that. So you still have the picture that, oh, once every two or three winters ice jams will take you below 5,000 cubic feet per second, at least if you can believe past records.

Q. What is the basic general policy of the Corps of Engineers with respect to regulation of these waters for the purpose of sewage and industrial waste dilution?

A. I will read this one to be sure I state it exactly right. "It is the basic general policy of the Corps of Engineers that low flow regulation for sewage and industrial waste dilution generally should not be used as a substitute for treatment works."

MR. EDELMAN: We have no further questions, Mr. Chairman.

CHAIRMAN SAMSON: Cross-examinations by either the State of Kansas or the State of Missouri?

By any of the other political subdivisions?

MR. SCHOENLAUB: No questions.

CHAIRMAN SAMSON: And by industry?

MR. BROWN: No questions.

CHAIRMAN SAMSON: Any questions by members of the Board?

MR. POOLE: I have only one, Mr. Chairman.

Q. (By Mr. Poole.) To recap your final statement, did I understand you to say that the winter flows would vary from 20,000 cfs to 7,500 in wet versus dry years, with the exception of the effect of ice jams that might lower it to 5,000?

A. That is correct, sir. That 20,000 in the case of very wet years when there are good flows from the tributaries and good supply of water to the reservoirs, the minimum water level we deem it maintaining through the winter here. In dry years 7,500 we deem it maintaining through the winter. As ice jams come along and intercept the flows there is no way, with the reservoirs, we can keep the ice from temporarily impounding the water and causing the discharges to drop lower temporarily for a few days.

Q. My question, what is the approximate duration of these lower discharges due to ice jams, three or four days or three or four weeks?

A. We have actually had experience they have been as short as two or three days to as long as ten days in the last four years.

MR. POOLE: Thank you.

CHAIRMAN SAMSON: Any further examination of this witness?

You may be excused, Mr. Pafford.

THE WITNESS: I want to thank the Board very much for the courtesy. I appreciate it.

CHAIRMAN SAMSON: That is all right. Thank you for being here.

(Witness excused.)

(Off the record discussion about arrangements for the river inspection trip.)

CHAIRMAN SAMSON: Very well. We stand adjourned to be back here at 3:15.

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WHEREUPON, the hearing stood at noon recess until the hour of 3:15 o'clock in the afternoon, at which time the following further proceedings were had and entered of record, to wit:

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## AFTERNOON SESSION, MONDAY, JULY 27, 1959

CHAIRMAN SAMSON: The hearing will now come to order.

Will you proceed now, Mr. Stein, with your next witness, please.

MR. STEIN: I call the attention of the Chair that one member of the Board is not present, sir.

CHAIRMAN SAMSON: I am well aware of that, but I expect him momentarily.

MR. STEIN: Here he is.

May the record show that he is here now, since I have raised this question?

CHAIRMAN SAMSON: Very well.

MR. STEIN: Mr. Clare.

HERBERT C. CLARE,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

### DIRECT EXAMINATION

BY MR. STEIN:

Q. May we have your name and address?

A. My name is Herbert C. Clare, C-l-a-r-e. I reside at 4812 West Sixty-fourth Street, Mission, Kansas.

Q. You will recall, Mr. Clare, that you were sworn earlier and your testimony is still under oath?

A. I do.

Q. By whom are you employed?

A. I am employed by the United States Public Health Service.

Q. What position do you hold?

A. I have a position of responsibility in water supply and water pollution control activities as Assistant Regional Engineer.

Q. Generally what are your duties in this position?

A. To help in the development of comprehensive water pollution control programs, taking into consideration the many uses of water, conservation and improvement of quality for domestic water supply, fish and wildlife propagation, recreational use, use for agriculture and industry, as well as other legitimate uses. I also help with joint investigations of water supply and water pollution control problems with the states and carry on cooperative activities with the state and other agencies on water pollution problems, especially in connection with prevention and control of pollution.

Q. How long have you been employed by the Public Health Service?

A. I have been on active duty with the Public Health Service for four years.

Q. By whom were you previously employed?

A. Eighteen years prior to that I was in sanitary engineering work with the Idaho Department of Public Health. The last 12 of those 18 years I was State Sanitary Engineer.

Q. In general what were your duties related to water pollution control in Idaho as State Sanitary Engineer?

A. Among other things, I was responsible for the state water pollution control program and plan, supervised investigations of water supply and water pollution control problems, had experience in the identification of the type and sources of wastes, including domestic wastes and industrial wastes, took corrective action or instituted corrective action in water pollution control problems, and evaluated results of our activities.

Q. Would it be correct to state that as State Sanitary Engineer of Idaho you were in charge of the State Water Pollution Control Program?

A. That is correct.

Q. Have you had any special educational training in the field of water pollution control or sanitary engineering?

A. Yes. Besides chemical engineering training and experience I have had graduate work in sanitary engineering.

Q. Well, would you care to list your degrees for us?

A. Yes. I have a Bachelor of Science in chemical engineering from the University of Idaho in 1929, a Master of Science, a major in Chemistry and minor in Physics, from the University of Idaho in 1934, Master of Science in sanitary engineering from Harvard University in 1939.

Q. As part of your duties have you inspected the Missouri River in the area of St. Joseph, Missouri?

A. I have.

Q. Are you familiar with the waste discharges from St. Joseph, Missouri, and from the industries named in the notice of this hearing?

A. Yes, I am.

Q. Have you personally visited the waste outlets discharging wastes into the Missouri River from St. Joseph, Missouri, and those industries?

A. Yes, I have visited all the waste outlets as they enter the river.

Q. Have you as part of your official records an aerial photograph of the places you visited personally?

A. Yes, I do.

Q. I call your attention to what purports to be an aerial photograph of the St. Joseph, Missouri, river front and ask you if that is the aerial photograph?

A. That is it.

MR. STEIN: I ask that this aerial photograph be marked as Government Exhibit No. 13. This photograph is in two parts and bolted together. The part on the left is designated as B1-2V-108 (8-5-58), and I ask that be designated as Government Exhibit 13(A), and that the part on the right which is marked B1-2V-106 (8-5-58) be designated as Government Exhibit 13(B), both of these parts to be considered as a single exhibit as Government Exhibit No. 13.

(Government Exhibit No. 13, (A) and (B), marked for identification.)

Q. There are some markers placed on that photograph. What do these markers represent?

A. Well, these marks I consider as--well, primarily they are points at which wastes are discharged into the Missouri River. There is also some other information marked which I felt might be pertinent to that matter.

Q. Does this include industrial sites, these other points, locations?

A. Yes, it does.

Q. Who placed these marks on the chart?

A. They were either placed on by myself or under my direct supervision.

Q. Based on your personal observation is this an accurate description, representation, of the Missouri River waterfront in and near St. Joseph, Missouri

A. Yes, I consider it as an accurate presentation?

Q. Will you generally describe this photograph?

A. The photograph shows almost entirely the St. Joseph Bend of the Missouri River. The river flows in a southerly direction past St. Joseph and when it reaches the industrial area to the south it swings toward the west. The left side of the map is north, the top is east.

I would call your attention to the state line, which follows the old channel of the Missouri River, which up until a few years ago flowed east just above the St. Joseph Bend. As a result of a flood then a few years ago this was cut off and the river now flows generally northeast to the principal part of the St. Joseph waterfront and then swings to the--or it flows southeast, pardon me, and then swings southwest. This is a part of Missouri (indicating). This is the--

Q. Will you designate where you are pointing to?

A. Yes, sir.

Q. That is the lower left-hand corner facing the chart?

A. That is correct.

Q. The northwest?

A. The northwest part of the chart is still in Missouri, although it is on the west side of the Missouri River at present and the Municipal Airport is located in that section.

Q. Will you indicate Kansas territory on that chart in general terms?

A. Yes. Kansas is in the central part of the map. I don't know just how to describe it.

Q. Would you say it is in the central lower part of the map, below the river?

A. That is correct. It is in this portion (indicating), central lower part.

MR. STEIN: I offer this aerial photograph as Government Exhibit No. 13.

MR. BROWN: I have no objection to the exhibit. I do object to the marks he has placed upon it unless I know about what they mean. I have no objection to the photograph as representing this area.

CHAIRMAN SAMSON: Subject to that objection it will be received.

(Government Exhibit No. 13, (A) and (B), received in evidence.)

Q. (By Mr. Stein.) Will you use this photograph, Mr. Clare, to identify the specific sewage outlets and what you observed in your inspection of them? Please give us the dates of that inspection, if you have them.

A. I will. Starting at the northernmost part of the map, which incidentally includes the northernmost sewer outfalls of the city, there are two sewer outfalls on Roy's Branch. One of these is at the end of Tyrone Street where it intersects Roy's Branch and the other is at the end of St. Paul Street where it intersects Roy's Branch. Both of these sewers discharge untreated sewage into Roy's Branch. The presence of sewage in the flow from those sewers at the time of my visit on May 7, 1959, was indicated by the presence of feces, bits of toilet paper, detergent suds, and a gray to gray-blue color and a pungent, musty odor of sewage. Roy's Branch, then, flows for a distance of approximately one mile and enters the Missouri River at that point (indicating) near the north end of St. Joseph Bend.

Q. Do you have that point marked so we can identify it for the transcript?

A. It is marked as M-1.

Q. That is sufficient.

A. Progressing downstream, the next sewer outfall is the Blacksnake Sewer. This sewer was visited on May 7, May 19, and June 17. The Blacksnake Sewer is one of the four largest sewers serving the City of St. Joseph--

Q. Pardon me, Mr. Clare. What year was that you visited in May?

A. Oh, '59.

Q. Are all these dates 1959?

A. All 1959.

Q. Thank you, sir.

A. It is one of the largest sewers in the St. Joseph municipal sewer system. It carries considerable domestic sewage and industrial wastes from a highly developed area. It is, as are all sewers in the St. Joseph system, a combined sewer. That is, it discharges both storm and sewage wastes, storm water and sewage wastes. It carries the surface water and storm drainage from the entire Blacksnake Watershed, draining the Blacksnake Hills to the northeast. This is near the foot of Jules and Francis Streets and it is marked on this map as point M-2. Actually the sewer outlet, which is 17 by 14-1/2 feet in size, is about 100 yards from the Missouri River where the current is flowing.

Q. Mr. Clare, have you had an opportunity to examine the flow from this sewer and the engineering reports introduced as exhibits in this record?

A. I have.

Q. Based on that information, do you think you can make an estimate of the amount of sewage that comes out of Blacksnake outfall during dry weather flow?

A. Yes, I have estimated the dry weather flow from Blacksnake Sewer at about one and a half million gallons per day.

Q. Thank you. Would you proceed to the next point?

A. The next sewer outlet downstream is the Francis Street Sewer. This is referred to in the Black and Veatch Report as the railroad sewer. This is a small line, 24 inches in diameter. I visited this site on May 7, 1959, May 13, 1959 and May 19, 1959. It carries a small amount of domestic sewage and wastes from a commercial area immediately east of the point of discharge. The wastes from this sewer are frequently colored, varying colors, and the source of this color was traced to a plant which dyes paper stock used in making paper boxes and these were the waste dyes that colored the discharge from this sewer. Laundry wastes and domestic sewage were also evident at that time.

Q. Mr. Clare, what were some of the colors you have seen coming out of this outfall?

A. Well, I have seen it rose colored and pink and red.

The Francis Street Sewer is marked on this map as point M-3, the outfall is point M-3.

The next downstream is the Felix Street Sewer outfall.

CHAIRMAN SAMSON: What is the name of that?

A. Felix, F-e-l-i-x. This is a small sewer 36 inches in diameter. This sewer was observed on May 13, 1959, and May 19, 1959. It serves a small industrial area to the east carrying some domestic sewage and wastes from commercial establishments such as restaurants and other establishments in that part of St. Joseph. This outfall is marked on this map as point M-4.

The next sewer downstream is the Edmond Street Sewer, having its outfall at the foot of Edmond Street. It is a small 20-inch line. This was observed on May 13, 1959, and on May 19, 1959. This sewer carries the wastes from the Edmond Street plant of the St. Joseph Power and Light Company, a small amount of domestic wastes and other wastes from a commercial area immediately east of the outfall. This was referred to in the Black & Veatch Report as the lower railroad sewer. It is marked on this map as point M-5.

The next outfall downstream is the Charles Street Sewer outfall. This outfall was observed on May 13, 1959, and May 19, 1959. It was one of the first sewers constructed in St. Joseph, according to the Black & Veatch Report. It is also one of the largest. It is 9 feet in diameter and it carries considerable industrial wastes.

Q. Mr. Clare, based on your observations, studies and investigations of the problem have you made an estimate of the dry weather flow from the Charles Street Sewer?

A. Well, I would estimate the dry weather flow from Charles Street to be slightly less than from Blacksnake, about 1.4 million gallons per day.

Q. Thank you.

A. The outfall of the Charles Street Sewer is marked on this map as point M-6.

The next sewer outfall downstream is the Messanie Street Sewer outfall. It is a small sewer line, 36 inches in diameter. The outfall is at the foot of Messanie Street. This site was visited on May 13, 1959, and again on May 19, 1959. It has some domestic sewage and some wastes from a small commercial area to the east. It is marked on this map as point M-7.

The next sewer outfall downstream is the Patee Street Sewer. It is a relatively small line, 40 inches in diameter at its outfall.

MR. POOLE: What is the name of that street, sir?

Q. (By Mr. Stein.) Spell that.

A. P-a-t-e-e. It serves a small area of the city. Its outfall is at the foot of Patee Street, marked on this map as point M-8. The invert elevation of this sewer line is low and on all occasions when it was visited before, it was submerged--I saw it today on the boat trip--but although it was submerged we located it on May 13, 1959, at which time we could see the sewage welling up in the Missouri River water at this point of discharge. It is marked on this map as point M-8.

The next outlet downstream is the Olive Street Sewer. This is a 4-foot line, 4 feet in diameter. Its outfall is in the Missouri River at the foot of Olive Street. It carries very little industrial waste, practically all domestic waste from a residential area. This sewer outfall was observed on May 13, 1959. It is marked on this map as point M-9.

The next outlet downstream is near the foot or between the foot of Lafayette and Seneca. This is a small line, 10 inches in diameter, cast iron at the outfall on the bank of the Missouri River. It is essentially a surface water and storm water drain. The Woodbury Chemical Company, which has its plant just east of the outfall, is connected to this line and we have designated it in our records as the Woodbury Sewer outfall. It carries very little domestic waste, a little industrial waste, but is essentially a storm and surface water drain. This outlet was located and observed on May 13, 1959. It is marked on this map as point M-10.

The next outlet downstream is the Mitchell Avenue Sewer outfall. This is one of the largest sewers serving the St. Joseph sewerage system. The outfall is 14 feet in diameter. It is in the Missouri River at the foot of Mitchell Avenue. It carries considerable industrial wastes as well as domestic wastes from a large area of the city to the east.

Q. Mr. Clare, based on your observation, studies and investigations, have you an estimate of the amount of wastes discharged from the Mitchell Avenue Sewer?

A. This is, as I said, one of the largest sewers in the system. I have estimated the dry weather flow from this sewer to be on the order of 2.7 million gallons per day. This sewer outfall was observed on May 13, 1959, and again on May 19, 1959, and is designated on this map as point M-11.

The next outfall downstream is the Duncan Street Sewer outfall. This is immediately below the railroad bridge near the Corps of Engineers dock. It is a small line, 24 inches in diameter. It has its outfall in the Missouri River at the foot of Duncan Street. It carries at times considerable oily wastes, some domestic sewage in addition to that. This point was visited on May 13, 1959, and is designated on this map as point M-12.

The next outlet downstream is the Maple Street Sewer outfall. This outfall is located at the foot of Maple Street. It is 6 feet in diameter at the outfall in the Missouri River. It carries no appreciable amount of industrial wastes, largely domestic. This outfall was visited on May 13, 1959. It is designated on this map as point M-13.

The next sewer outlet downstream is the Hickory Street Sewer. This is another 6-foot sewer. Its outfall in the Missouri River is at the foot of Hickory Street. It serves a small residential area east of the foot of Hickory Street. It has been observed on several occasions. The two of record are May 7, 1959, and May 19, 1959.

Q. Did you observe it on those dates?

A. Yes, I did. One peculiar thing about this outfall is that it seems to have no dry weather flow. Apparently the sewer has been damaged upstream from the outfall and the sewage is discharging into the ground near the banks of the Missouri River. The outfall is designated on this map as point M-14.

The next outlet, the Walnut Street Sewer, is a small one. The outfall is 21 inches in diameter. The outfall is in the Missouri River at the foot of Walnut Street. It carries essentially domestic sewage. This particular outlet was not referred to in the Black and Veatch Report. It was observed on May 7, 19--

Q. Did you observe it?

A. I observed it on May 7, 1959, at which time it was submerged. However, the sewage was identified or I was able to locate it by the presence of sewage in the Missouri River water. It is located on this map or marked on this map as point M-15.

The next outlet downstream is the Whitehead Sewer outfall. This is one of the largest serving the St. Joseph municipal sewerage system. The outlet, which is some 200 yards from the bank of the Missouri River, is 14 feet by 16-1/2 feet at its outlet. It serves the largest tributary area of any of the St. Joseph outfall sewers. Near the Missouri River it is enclosed under Second Street and for a short distance to the west and above that point it is again an open channel. It carries considerable industrial waste. I observed it on May 7, 1959, and again on May 19, 1959. On both occasions I observed gas bubbles rising from the open ditch or in the sewage in the open ditch between the outlet and the Missouri River and also rising sludge from the bottom of the channel due to buoyancy from gas bubbles. Also there was considerable grease and scum and floating material on the wastes discharged by this sewer.

Q. Mr. Clare, based on your observations, studies and investigations do you have an estimate of the dry weather flow from the Whitehead Sewer?

A. Yes, I do. I estimate the dry weather flow from this sewer at about two million gallons a day.

CHAIRMAN SAMSON: Are you referring to the Whitehead Sewer?

A. Whitehead Sewer, yes, sir.

Q. (By Mr. Stein.) Mr. Clare, in your observations of the sewers, the first two you mentioned on Roy's Branch you indicated the characteristics of the wastes as characterizing municipal wastes. Aside from the Hickory Street Sewer, which you said was dry, when you visited these sewers on the dates mentioned did they all flow?

A. Yes, they did

Q. Were the wastes characteristic of municipal wastes using the same indication of what you had seen?

A. They were characteristic of municipal wastes. However, the discharges into Roy's Branch were essentially domestic sewage. In the Blacksnake, Mitchell and Whitehead Sewer outfalls there were considerable industrial wastes and the appearance was different. In the case of Blacksnake, in addition to the characteristic domestic sewage appearance we observed floating grease and scum and evidence of the presence of industrial wastes.

Q. Was there evidence of domestic waste in each?

A. Yes. Yes, indeed.

Q. And those that you mentioned having evidence of industrial wastes or wastes from commercial establishments, how, in general terms, do you determine that?

A. Well, there is a difference in the color. A characteristic domestic waste is gray-blue in color and it has a pungent or a musty odor. For industrial wastes, the color depends on the industry. Some of them are white or milky in appearance; some are red, if they are below a packing plant, because of the presence of blood or paunch manure or pen washings. I think that pretty well describes the industrial wastes from the St. Joseph sewers.

Q. Yes. Thank you.

A. I don't think I indicated that the Whitehead Sewer outlet is marked on this map as point M-16.

The next outlet point marked on the map is at the location of the Union Terminal Company yard operations. This is the location of the yard office. There is no designation at this point of the wastes from tenants of the Union Terminal Company. This applies only to the Union Terminal Company yard operations.

Q. When did you visit that?

A. This was visited on June 3. 1959, and again on June 4, 1959.

Q. By you?

A. I visited that.

Q. Did you see a flow?

A. No. No, the actual outlet was not located for this waste. Considering only the 10 employes in the yard office, it is a small amount of waste.

Q. Yes.

A. The location on this map is point I-18.

The next location on the map is the Stratton-Theis Grain Company. This is a grain storage and merchandising operation. There is no grain washing carried on at this plant at the present time. Wastes consist of domestic sewage from some 11 employes.

Q. Does this go to a sewer outfall?

A. Yes, the wastes from the toilet facilities and wash basin facilities at the Stratton-Theis plant go into what we have designated as the Larabee-Bartlett-Stratton outfall line.

Q. Will you locate that on the map, please?

A. The Larabee-Bartlett-Stratton outfall point is located on the map as Point I-4-14-6. Those happened to be the numbers of the industries.

Q. When did you observe this outfall or did you observe it?

A. Yes, I did. On June 3, 1959.

Q. Are there any other establishments discharging wastes into this particular outfall?

A. The other establishments discharging wastes are Bartlett & Company and Archer-Daniels-Midland Company. The Bartlett Company discharges wastes, domestic wastes only, from some 12 employes. There is no grain washing at that plant; it is storage and merchandising. The Bartlett Company has a separate outfall. I will come back to that a little later. But the Bartlett Company has no grain washing operations either. The Archer-Daniels-Midland Company, Commander Larabee Flour Mill, does have grain washers and the overflow from these washers goes to this sewer outfall. The overflow contains normally chaff, dirt and light grain. Apparently there are times when more grain than this is lost, because we observed or I observed at the outfall that a trap, a box, had been built to catch grain discharged through the waste line and there was present considerable fermenting grain in the vicinity of the outfall, numerous rats, and evidence that at times there was considerable waste grain that goes to the Missouri River at that point.

Q. Mr. Clare, what do you mean by fermenting grain? What happens to that grain when it gets out in the outfall? What is the appearance, can you describe it?

A. Well, it is-- Of course when the grain gets wet it starts to sprout or ferment or rot. It turns black as that rotting procedure progresses and it has a very strong unpleasant odor.

I said that Bartlett & Company has a separate outlet to the river besides the connection of the domestic sewer line to the Bartlett-Stratton-Archer line. During certain seasons of the year the pumps in the basement of the structure of Bartlett & Company discharge seepage water to a ditch that flows west from the railroad track to the Missouri River. This ditch does have some spilled grain, I mean some spilled grain is pumped out with this waste, and some of that does reach the Missouri River.

Q. Will you locate that outlet on the map?

A. The Bartlett & Company seepage outlet is marked on here as point I-6.

Q. When did you visit that?

A. On June 24 and on June 3, 1959.

Q. Were there discharges through that outfall at both times?

A. No. On June 3rd there was a discharge through that outfall, but there was none on June 24th.

The next outlet downstream is the Florence Sewer outfall, designated on this map as point M-17. This is a municipal sewer. I observed this on June 12, 1959. It is a 4-foot sewer. It carries only storm and surface water drainage. On no occasion did I observe any wastes that were being discharged from this outfall. It has its outfall in the Missouri River at the foot of Elk Street.

The next discharge, and almost adjacent to the Florence Sewer outfall, is the Stockyard Sewer, indicated on this map as point M-18. The Stockyard Sewer is 8 feet in diameter. The sewer runs generally in this direction (indicating). The outfall--

Q. Will you point to that direction? Is that southeast?

A. The direction is almost due southeast (indicating) from the point of the outfall. At the intersection of Packers Avenue and lower Lake Road, or near that intersection, it is joined by Packers Sewer, which is an industrial sewer serving the stockyard area along Packers Avenue and discharges into Stockyard Sewer near the end of Packers Avenue at lower Lake Road.

The municipal area contributing to the sewer above this point lies between Division Street on the north and Alabama Street on the south. I visited this sewer outfall on May 7, 1959, May 19, 1959, June 17, 1959, June 24, 1959, and July 1, 1959. This is predominantly an industrial waste outlet. I observed considerable floating grease and scum, pieces of animal intestines, lungs, gas bubbles from the bottom of the channel would occasionally rise and lift septic sludge, paunch manure, and so forth.

Q. Mr. Clare, do you, on the basis of your observations, studies and investigations, know the industries which contribute to this sewer?

A. Yes. The Albers Milling Company, located near the intersection of Packers Avenue and Lake Road at a point designated as point I-1 on this map, discharges domestic wastes from an average of four employes to this sewer outlet.

Q. Would you repeat that firm name again?

A. Albers Milling Company. This connection is near the intersection of Stockyard Sewer with Packers Sewer.

Anchor Serum is another company which discharges to Packers Sewer. It is indicated on this map as point I-3. It is near the south end of the stockyards area. The wastes from this plant are discharged through Packers Sewer into Stockyards Sewer and thence into the Missouri River. This is a vaccine and bacterine manufacturing plant. They have some pens of live animals and the pen washings and the plant wastes, according to the Black & Veatch Report, are flushed to the sewer. Cooling water from the condensers is also wasted in the sewer.

Q. When you refer to the Black and Veatch Report with reference to these industries, are you referring to the '59 Black & Veatch Report?

A. That is correct.

MR. STEIN: What exhibit number is that? That is Exhibit No. 5? May we check that for the record.

CHAIRMAN SAMSON: That is Exhibit No. 5.

MR. STEIN: Thank you.

A. Black and Veatch have estimated that the solids discharged from this plant into the Packers Sewer is on the order of 1,100 pounds per day.

The wastes from the Armour & Company plant are discharged to two outlets. Some of the wastes go to the Packers Sewer along Packers Avenue and some of the wastes go to Stockyard Ditch. I will refer to that later. The wastes that are discharged from Armour's plant at Packers Sewer, of course, enter the Stockyards Sewer and are discharged to the Missouri River at the Stockyards Sewer outlet.

The Kees-Lyon Oil Company has a retail and petroleum oil distribution plant on Lake Road near the intersection of Packers Avenue at a point on this map designated as point I-9. As far as wastes are concerned this is a very small operation. I estimate that the average number of employes is four and the domestic wastes from this plant are all that are discharged to this sewer. The St. Joseph Feed & Supply Company is located on Packers Avenue just south of the bend where the avenue runs more to the southwest at a point on this map designated as point I-10. The wastes from this establishment consist of the domestic wastes from some 15 employes and from hog pens where hog feeding demonstrations are carried on. These wastes are discharged into Packers Sewer through the Terminal Warehouse Sewer connection and flow thence into the Stockyards Sewer.

The St. Joseph Stockyard Company, with offices in the St. Joseph Live Stock Building on Illinois Avenue, operates the stockyard pen facilities, leasing some. These pens, for the most part, have a brick floor. Some of the pens are dry cleaned, the bedding and manure are hauled to a dump. Other pens are cleaned by flushing to the sewer. All wastes from the St. Joseph stockyard operation are discharged to Packers Sewer along Packers Avenue and the wastes then flow into Stockyards Sewer and thence into the Missouri River via the Stockyards Sewer outfall. The Black and Veatch 1959 Report estimated that the wastes discharged from the St. Joseph Stockyard Company operations was on the order of 4,600 pounds per day.

Q. (By Mr. Stein.) Of what?

A. Solids, settleable solids.

The Seitz Packing Company has a new plant located on Lake Road just east of the intersection with Packers Avenue. This is exclusively a cattle slaughtering and processing operation. Wastes from this plant are discharged to the Stockyard Sewer above the intersection with Packers Avenue or Packers Sewer. Black & Veatch estimated that the solids discharged from this plant would average 2,900 pounds per day.

Swift & Company, which is located in the northeast part of the stockyard area, is a packing plant operation with by-products. It is the largest of the operations in the stockyards district and according to the Black & Veatch Report contributes the greatest volume and strength of wastes. The wastes from this plant are, for the most part, discharged into Packers Sewer, thence into Stockyard Sewer. However, some of the wastes do go to Stockyard Ditch. The main part of the Swift & Company plant is indicated on this map as area I-15.

The Terminal Warehouse Company operates a rendering plant and at certain times of the year there are egg-breaking operations carried on at this plant. It is located just west of Packers Avenue near Lake Road. Wastes are discharged to Packers Sewer, go into Stockyard Sewer and thence into the Missouri River. Black & Veatch in 1959 estimated the wastes from this plant would average about 174 pounds of solids per day.

That covers--

MR. POOLE: Question. Do you mean settleable solids in all of these cases where you referred to pounds of solids per day?

A. That is correct. They are referred to both ways in the Black & Veatch Report, but we interpret that as meaning settleable solids.

That concludes the list of industries discharging wastes through the Stockyard Sewer cutfall.

The next outfall downstream from the Stockyard Sewer outfall is one used by Dannen Mills to discharge cooling water from its oil refining unit. It is located on this map as point I-8. I visited this point on May 19, 1959, and June 3, 1959, and on June 24, 1959.

Q. What did you observe?

A. The wastes from the cooling water outlet appeared to be entirely cooling water. I mean there was no evidence of contamination at the time of my visit.

The next point of discharge downstream is an outlet used by Lederle Laboratories Division of the Cyanamid Corporation and it--

Q. I think that is called the American Cyanamid Company.

A. American Cyanamid Company. It was my observation that this was essentially a cooling water outlet. The company does have another outlet downstream, but the upstream outlet was essentially cooling water.

The lower outlet, indicated on this map as point I-2, was a point of discharge of wastes from the laboratory's processes and hog pen cleaning and operations, the waste from the washing of equipment and the laboratory ûtensils and the serum manufacturing process.

Q. When did you visit that outlet?

A. I visited this location on May 19, 1959. The Black & Veatch Report indicates that the estimated wastes from this outlet are on the order of 1,100 pounds of settleable solids per day.

Q. Did you see any material coming out when you visited it?

A. Yes, there was considerable evidence of what looked like pen flushings and manure at the time of my visit.

CHAIRMAN SAMSON: Maybe I have lost you, Mr. Clare, but on this second reference, this 1,100 pounds of settleable solids, who are you referring to?

A. The American Cyanamid Company.

CHAIRMAN SAMSON: Oh. Thank you.

A. Lederle Laboratory Division.

Immediately adjacent to that outfall is one that is used by Dannen Mills for the discharge of domestic wastes from their offices. Some 60 employees are served by that sewer outlet.

The next point of discharge into the Missouri River is the mouth of Brown's Branch. Now here I think that I should like to--it is marked on this map at the lower end of the St. Joseph bend, at the southwest end of the St. Joseph Bend. I think I should like to go up to the head of this Branch and describe the wastes discharged to Brown's Branch in that way.

One of the companies discharging wastes that reach the Missouri River through the mouth of Brown's Branch is the St. Joseph Power & Light Company. The location on this map is point I-11. The waste discharge is at the upper end of Stockyard Ditch. Stockyard Ditch is marked here as being just west of Lower Lake Road and south of the St. Joseph Light & Power Company Lake Road Plant. The wastes from this plant consist of boiler blowdown water, water softener wastes, condenser cooling water, and domestic sewage from some 35 employes. I visited this waste outlet on June 3, 1959, and on June 17, 1959.

Q. Did you observe wastes coming out?

A. Yes, I did. For the most part, the appearance of the wastes from the St. Joseph Power & Light Company operation is white in color, milky, apparently discharges from a softener plant, although there is some domestic sewage that enters this line too.

Another industry that discharges to Stockyard Ditch, which discharges to Brown's Branch, is the Consumers Cooperative Association, marked on this map as point I-7. This is a fertilizer plant. Besides the domestic sewage from some 15 employes, on the average, the wastes from this plant consist of solids which are scrubbed from the fumes discharged from their acidulation dens. In this process the raw rock phosphate is placed in the dens and treated with sulphuric acid and the fumes and vapors that are given off are scrubbed with water and this waste then is discharged through the waste line to the Stockyard Ditch.

Q. Did you ever visit this point?

A. Yes.

Q. When did you visit it?

A. This was visited on June 3, 1959, and on June 24.

Q. Did you see waste discharges coming out?

A. No, I did not locate the exact point of the discharge of the wastes.

Another plant which discharges wastes to Stockyard Ditch is the Armour Plant that I referred to previously and some waste overflow from Swift, and these wastes are discharged through Stockyard Ditch and into Brown's Branch and thence into the Missouri River. Above the confluence of Stockyard Ditch with Brown's Branch, that is south of that point, Brown's Branch is an open channel with concrete lining.

At a point marked on this map as I-16 the Swift Fertilizer Plant discharges some wastes to Brown's Branch.

Q. Did you ever visit that point?

A. Yes.

Q. What date?

A. This was visited on June 4, 1959, and again on June 25, 1959.

Q. What did you see?

A. The only waste that is discharged to Brown's Branch by this plant is the overflow from the scrubber which removes the dust from the fertilizer compounding operation. The domestic sewage from some 22 employes is disposed of in a septic tank with subsurface sewage disposal system.

Q. Mr. Clare, there are two other points on your map, one in the northwest, way up. Are you through down there?

A. I have one more.

Q. Go ahead. I am sorry.

A. All right. At the present head of Brown's Branch, near the intersection of Alabama and Eureka Avenues, and approximately two miles from the confluence of Brown's Branch with the Missouri River, is the outlet of the Brown's Branch municipal sewer. This is a 9 x 9 double box municipal sewer and discharges sewage into Brown's Branch at that point.

Q. Does this find its way to the Missouri River?

A. Yes, sir, it does.

Q. When did you visit this?

A. This was visited on May 13, 1959, and May 19, 1959.

Q. Was any sewage coming out of this municipal sewer?

A. Yes, there was sewage coming out of the municipal sewer with the typical characteristic domestic sewage appearance.

MR. POOLE: When you say 9 x 9 do you mean feet or inches?

A. Feet. 9 feet by 9 feet double box side by side. The net dimensions are approximately 18 feet by 9 feet.

MR. JOHNSON: That is domestic sewage?

A. Remember these are storm and domestic sewage that drain. I mean storm water from the Brown's Branch drainage area comes down through that line to the Missouri River, the storm and surface drainage.

Q. (By Mr. Stein.) Mr. Clare, there are one or two markers on the map that I have noted that haven't been explained, one in the northwest corner.

A. (Indicating)?

Q. Right there.

A. This is the location of the waste outlet from Rosecrans Airport. The Rosecrans Airport is a municipal airport. The wastes are from the terminal facilities, restaurant, there is a National Guard establishment, and other developments at Rosecrans. These wastes are discharged without treatment into a swampy area along the banks of what was formerly the Missouri River, the old channel of the Missouri River adjacent to the Missouri-Kansas state line.

Q. And there is a mark on the extreme western portion of the map down below?

A. Extreme western? Oh. Excuse me. In the extreme southwest part of this map is a recreational area, a lake, but this mark was placed here to indicate the presence of a boat landing, the St. Joseph Motor and Yacht Club boat landing is immediately below this point which is marked here as St. Joseph Outboard Motor Yacht Club.

Q. Thank you. Mr. Clare, based on these observations, studies and investigations you have just related, did you compute the volume of strength of wastes from the City of St. Joseph, Missouri, being discharged from these sewer outfalls?

A. I did.

Q. By the way, do you know how many outfalls you have described for us?

A. Well, there are 20 municipal outfalls and as I remember 18 or 19 industrial waste sources.

Q. To get back to the municipal wastes, in general terms how did you make this computation of the volume of strength of wastes?

CHAIRMAN SAMSON: Mr. Stein, I see that the time is approaching, about 10 minutes to 5, and it has been a long day. I suppose some of these gentlemen here would probably like to get back to their offices and do a little checking and all that sort of thing. I wonder if this wouldn't be a good place to adjourn until 9 o'clock tomorrow morning?

Is it agreeable with you gentlemen that we adjourn until 9 tomorrow morning?

MR. BROWN: Yes, sir.

MR. STEIN: Perfectly.

CHAIRMAN SAMSON: We will adjourn, then, until 9 tomorrow morning.

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WHEREUPON, the hearing was adjourned until 9 o'clock a.m. of the following day, at which time the following further proceedings were had and entered of record, to wit:

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## MORNING SESSION, TUESDAY, JULY 28, 1959

CHAIRMAN SAMSON: Gentlemen, the hour of 9 having approached, we will now call the hearing to order and you may proceed with your witnesses, Mr. Stein.

MR. STEIN: Mr. Clare.

HERBERT C. CLARE,
resumed the stand and testified further as follows:

DIRECT EXAMINATION (Cont'd.)

BY MR. STEIN:

Q. Mr. Clare, you will recall that you were sworn yesterday and your testimony is still under oath?

A. I do.

Q. Based on your observations, studies and investigations did you compute the volume of strength of wastes from the City of St. Joseph, the volume of strength from within the city limits, being discharged from the sewer outfalls you have described?

A. I computed an estimate of the volume and strength of waste from the city sewers.

Q. In general terms how did you make this computation?

A. I estimated the population served by the sewer system and contacted administrators of industries served by the city sewer system. For the domestic sewage we used commonly accepted factors to estimate the flow of domestic sewage, the dry weather flow, and for the industrial flow, flow from industrial plants, we used the data on flows that we gathered from the company officials.

Q. Will you give the results of this computation?

A. I estimate the total flow, total dry weather flow, from the city sewers at 10 million gallons a day.

Q. Go ahead.

A. The strength of sewage from the city system as measured by the BOD population equivalent is estimated at 159,000. I estimated the solids, settleable solids, discharged from the city sewers at 24,100 pounds per day.

Q. On the basis of your observations, studies and investigations did you compute the volume and strength of wastes from the industries named in this notice flowing through the outfalls you observed to the Missouri River?

A. I did.

Q. In general terms how did you arrive at this computation?

A. I studied the Black & Veatch Reports, the Exhibits 3, 4 and 5, and used information contained in their reports, essentially Exhibit 5, which is the Stockyard Survey Report made by Black & Veatch. Where I needed additional information I contacted industries within the stockyards area and using factors of population equivalent and information on water uses and waste discharges I calculated the volume and strength from the stockyards area.

Q. As far as you know, are any of the wastes coming from within the City of St. Joseph receiving any treatment?

A. None is receiving treatment as far as I know.

Q. As far as you know are any of the wastes getting into the sewers coming from the industries named in the notice receiving any treatment?

A. The wastes discharged to the sewers, to the best of my knowledge, receive no treatment.

Q. Based on your knowledge of the field of waste disposal and sanitary engineering, are wastes of this type amenable to known methods of treatment?

A. Yes, they are.

Q. In the course of your investigations did you take any photographs of what you saw?

A. I did.

Q. I would like to go back a little, if I may, and go back to these industrial wastes. You stated you computed the industrial wastes, if I recall, and gave the basis for your computation?

A. Yes.

Q. However, we did not get the results. Would you mind giving us those now?

A. I computed that the estimated dry weather flow from the stockyard area to be 11.3 million gallons a day. The strength measured in BOD population equivalent I estimated at 485,300 people. The suspended solids I estimated at 57,200 pounds per day.

CHAIRMAN SAMSON: I didn't get that.

A. 57,200 pounds per day.

CHAIRMAN SAMSON: Thank you, Mr. Clare.

Q. (By Mr. Stein.) I would like to take up again and repeat my last question. In the course of your investigations and observations did you take any photographs of what you saw?

A. I did.

Q. Did you have these photographs developed?

A. I did.

Q. What form of development did they take?

A. These were colored photographs and I had 2 by 2 transparencies made, 2 by 2 slides.

Q. Do you have these slides with you?

A. I do.

Q. Are these slides accurate representations of what you saw at the time of the taking of these photographs?

A. They are.

Q. Including color and the objects they purport to represent?

A. They are.

Q. May I have the slides?

MR. STEIN: I ask that these slides be marked as Government's Exhibit 14 (A) to (M) for purposes of identification.

CHAIRMAN SAMSON: Mr. Stein, how are you marking these exhibits?

MR. STEIN: 14 (A) to (M) for purposes of identification.

(Government's Exhibit 14, (A) to (M), marked for identification.)

MR. STEIN: We are going to ask Mr. Clare to cause these to be projected for purposes of identification. I wonder if we can establish this projection screen.

Will you cause slide 14-A to be projected for purposes of identification?

CHAIRMAN SAMSON: Wouldn't it be more effective or more convenient if the lights were out?

THE WITNESS: I think I can read my notes. I should have brought a flashlight.

MR. HOPKINS: Is that too much light?

CHAIRMAN SAMSON: How about the north bank, Mr. Hopkins? Could you control those instead of the middle ones?

All right.

(Slide.)

Q. (By Mr. Stein.) Will you describe this?

A. This is a photograph of the boat landing at the St. Joseph Outboard Motor Yacht Club below St. Joseph. This is a mile or so below the mouth of Brown's Branch.

Q. What date did you take this picture?

A. This picture was taken on May 19, 1959.

And the next one.

Q. May we have the next?

(Slide.)

A. The next is numbered (B).

Q. May we go back to the (A) picture again?

(Slide.)

Q. What does that sign say on the tree in that picture?

A. "St. Joseph, Mo., Outboard Motor Yacht Club."

Q. May we have 14 (B)?

(Slide.)

A. 14 (B) was taken on June 24, 1959, at Stockyard Ditch where Stockyard Sewer empties into the ditch, and you can see a piece of animal intestine hung up on the rock (indicating) in the sewage waste.

Q. Did you take this picture?

A. Yes, I did.

Q. May we have 14 (C)?

(Slide.)

A. 14 (C) was taken on May 7, 1959, again at Stockyard Ditch. Note the characteristic red-brown color of the wastes in the foreground (indicating). The black material (indicating) is sludge that has been made buoyant and has raised from the bottom of the ditch. It is in a septic condition or putrefying condition. The white material (indicating) is grease and grease can be seen hung up on the bank in the weeds (indicating).

(Slide.)

A. (D) was taken on May 7, 1959. at the head of Stockyard Ditch and shows the bloody packing house wastes being discharged to the river (indicating).

(Slide.)

A. (E) was taken on June 30, 1959, at the outfall of Stockyard Sewer. You can see the packing house industrial area in the background (indicating). The floating material (indicating) is grease. This is the characteristically brown color (indicating) of the discharge from Stockyard Sewer, with floating grease and scum (indicating).

(Slide.)

A. (F) was taken on May 7, 1959. This is on Whitehead Ditch just west of Sixth Street, where the sewer outfall or sewer opening is east of this point (indicating) and the sewage flows in an open channel here and you can see the characteristic red-brown color (indicating) of this waste, with grease (indicating) and in this case some oil or grease (indicating).

Q. (By Mr. Stein.) Mr. Clare, does that whole channel consist of sewage?

A. Yes, this is a--this channel does carry storm water drainage.

Q. Was that during dry weather when you took that picture?

A. This was during dry weather, yes.

(Slide.)

A. (G) was taken on May 7, 1959, and this is the Sixth Street opening of the Whitehead Sewer, showing the red-brown wastes (indicating) and the floating grease (indicating).

(Slide.)

A. This is number (H), taken on May 7, 1959. This is the Lower Whitehead Sewer outfall. This is some 200 yards east of the confluence with the Missouri River. The discharge shown at the time this picture was taken and observed on other occasions is white in color (indicating). There is also the characteristic brown color of the waste here (indicating), probably caused by the presence of paunch manure, and the floating grease (indicating) on the sewage.

(Slide.)

A. This is (I). It was taken on May 19, 1959. and this is the Mitchell Street outfall of the St. Joseph municipal sewer system. The size of this sewer is 14 feet at this outfall.

(Slide.)

A. (J) was taken on May 13, 1959. This is one of the smaller municipal sewers. This is the Edmond Street Sewer (indicating) just south of the water intake works for the Edmond Street plant (indicating) of the St. Joe Power & Light Company. These are not wastes--or this contains the waste from the Edmond Street plant of the St. Joseph Power & Light Company.

Q. Mr. Clare, what you pointed to, are those wastes pouring directly into the Missouri River?

A. Yes, this is the Missouri River (indicating), this is the main channel at this point (indicating) on this side, so these wastes are discharged directly to the river.

(Slide.)

A. (K) is a picture of Francis Street Sewer outfall. This is a small sewer. This picture was taken on May 13, 1959, and is the outfall which I previously referred to as discharging colored wastes from a paper box top dying plant. This deep red color (indicating) was caused by the presence of the dye.

Q. Mr. Clare, does that color in that photograph accurately represent what you saw at that time?

A. Yes, it does.

Next.

(Slide.)

A. (L) was taken on May 7, 1959, and is the outfall of the Blacksnake Sewer. You can see the date 1903 (indicating) and industry in the background (indicating). This is one of the large sewers. The size is 14-1/2 by 17 feet.

(Slide.)

A. This was taken at the Blacksnake outfall on May 7, 1959, and shows a condom (indicating) and feces (indicating), which is characteristic of materials contained in the domestic sewage discharges.

That completes the series of pictures.

Q. Thank you.

MR. STEIN: Mr. Chairman, I offer these slides in evidence as Government Exhibit 14, labeled 14 (A) to (M).

CHAIRMAN SAMSON: Any objection, Gentlemen?

MR. BROWN: No objection.

CHAIRMAN SAMSON: They will be so received.

(Government's Exhibit No. 14, (A) to (M), received in evidence.)

Q. (By Mr. Stein.) Based on your investigations and observations, are the discharges you have described from St. Joseph, Missouri, and the industries named in this notice continuing substantially unabated from the time you made this observation?

A. Yes, they are.

Q. You have heard the testimony previously of Mr. Pafford of the Corps of Engineers and you have described the type of wastes coming from St. Joseph, Missouri, and you recognize from Mr. Pafford's testimony the type of and amounts of water we have in the Missouri River. Would you consider the Missouri River below St. Joseph, Missouri, to be a safe place for coming into contact with water, such as boating, swimming, water skiing?

A. I would not consider it as a safe place.

Q. What effect, in your opinion, do these wastes from the area you have described have on the interstate waters of the Missouri River? How do they affect the water quality? Do they help it?

A. Well, certainly not. They would certainly have polluting effects. They would degrade the quality of water and unquestionably interfere with water uses.

Q. Would you consider this to constitute pollution?

A. I would.

MR. STEIN: We have no further questions of Mr. Clare, Mr. Chairman.

CHAIRMAN SAMSON: Any cross-examination by representatives from either the States of Kansas or Missouri?

Cross-examination by any other political subdivision, namely the City of St. Joseph?

MR. SCHOENLAUB: No, I have no questions.

CHAIRMAN SAMSON: Mr. Brown, do you have some cross-examination, sir?

MR. BROWN: Yes, sir, I have some questions.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Clare, in your direct testimony you took these sewers or these outfalls starting at the north and going south. Of course I am not so much concerned with the northern sewers, but as you came down you got to--well, you passed Hickory and Walnut and Whitehead. Now, the Whitehead Sewer, does the waste from the Dugdale Packing Company come through Whitehead?

A. Yes, it does.

Q. How did you get your figures for the solids from Dugdale's?

A. I conferred with the management at Dugdale, got an average figure of the amount of beef processed per day, and by applying figures used by industry converted that to the solids.

Q. Suspended solids?

A. Yes, sir.

Q. And that is the figure you used, then, as a portion of the solids that would come out of the Whitehead Sewer?

A. Yes, sir.

Q. Now, the Union Terminal, you referred to it as the Union Terminal Yards or the U. T. Railroad Sewer, you can see that that causes very little trouble, that is very small?

A. Oh, it is small, yes.

Q. Stratton-Theis outfit is extremely small and presents no particular problem, that is true, isn't it?

A. It is small.

Q. And the Bartlett-Archer-Daniels, which also empties into that line, those are small matters that can easily be handled by septic tanks or something like that?

A. The manner in which they are handled I think would have to fit in with the state plan when it comes to treating domestic sewage by using septic tanks. The waste from the flour mill probably should receive treatment separate from the domestic sewage.

Q. However, that still is not a large problem?

A. Well, at times it appears to be large because there is evidence at the outfall of this 18-inch waste line that there is considerable grain wasted at times. There was a trap there to save the grain and there was a great deal of rotting grain near the outfall, many rats. So I think there is a problem there.

Q. I say it is not a large problem; it can be easily handled as far as that industry is concerned?

A. Well, I have stated that all these wastes can be treated, yes, they can be.

Q. Now, skipping the Stockyards Sewer for a moment, I think perhaps you are a little in error on your Dannen outlets and the American Cyanamid outlets. Isn't it a fact that Dannen, there is a 12-inch pipe, 12-inch vitrified tile sewer, from Dannen's that cuts across the west end of American Cyanamid and empties in the river north of American's outlet? Let me show you this. This (indicating) is north.

A. Yes.

Q. American Cyanamid (indicating). There is the one you referred to as Dannen (indicating)?

A. That is correct.

Q. And that, if you will notice on this plat, American Cyanamid does not drain into that?

A. That is correct.

Q. So the northernmost as you reach that industrial area is a 12-inch vitrified tile drain from Dannen's which handles cooling water, isn't that correct?

A. That is correct. And I believe that is the way I stated it, Mr. Brown.

Q. And then you referred to two American Cyanamid outlets. Actually you have a 12-inch vitrified tile and then you have a 6-inch pipe over that, isn't that correct?

A. Well, that is not the way I had it. Now, this location may not be exactly accurate. If that is an "as installed" plan, the location up here is not--

Q. This is an "as installed" plan to go out one or the other, one is over the other.

A. I have them separated by some distance, approximately 20 yards. This map shows that they are, as you say, side by side or one over the other.

Q. Now, both of those are extremely small, aren't they?

A. You mean the pipes are small?

Q. Yes.

A. Well, relatively. The--

Q. Well, when you testified about the city sewers, you very carefully gave the size of each one of those sewers and when you got to these industrial sewers you neglected to state the size. Now, it is a fact that these two outlets are 12 inches, I believe, and isn't it 6 inches on top?

A. That is probably correct.

Q. 6-inch line from the main building?

A. I think I stated--I gave an idea of the amount of wastes from the American Cyanamid Company when I stated that Black and Veatch had reported that some 1,100 pounds of solids per day are discharged through their line.

Q. I will get to that in a moment. I want to get the size of these at first. Can we agree that it is a 12-inch tile for the cooling water and a 6-inch line?

A. For Dannen?

Q. No, for American Cyanamid.

A. That is all right with me.

Q. All right, sir. Now, you took the 1959 report of Black & Veatch, I believe it is Exhibit 5, and you simply took their figures and translated that into solids. Now, he said it was about 1,400 parts PPM, parts per million, isn't that correct?

A. May I refer to Exhibit 5?

Q. Yes, certainly. Page 12.

A. Well, I took my information from page 33.

Q. All right, sir.

A. 1,400 parts per million concentration of solids. 1,162 pounds per day.

Q. He was talking about suspended solids in the Black & Veatch Report, wasn't he?

A. That is correct.

Q. And you simply converted that by using the percentage 1,400 parts per million and you considered the amount of water by the gallonage as 8 pounds per gallon and figured it out, isn't that correct?

A. To get the pounds of solids discharged? It was given directly, I didn't have to calculate it.

Q. Well, it was suspended solids?

A. That is correct.

Q. There is a vast distinction between suspended solids and the settleable solids, isn't there?

A. Yes, there is a difference.

Q. And this plant, this treatment plant, that is being projected for St. Joseph is a primary treatment plant to treat only settleable solids?

A. That is what I understand. That has been the plan that has been discussed.

Q. So it isn't designed to treat suspended solids. Now, in city wastes the percentage of settleable solids as compared to suspended solids is about 50 percent, isn't it?

A. Oh, at times.

Q. Isn't that the generally accepted figure?

A. Well, I think probably that is a little high. I notice that Black & Veatch used the term interchangeably. They referred in some places to solids and some places to suspended solids.

Q. The whole tenor of their statement is suspended solids all through both reports?

A. That is the way we interpret it.

Q. That is correct. Now, on industrial wastes isn't it true that only about 20 percent constitute settleable solids?

A. Well, that depends on the industry.

Q. Well, did you check on each one? In making your conversion, what I am trying to get at, you never made the distinction between suspended solids or settleable solids, did you.

A. Mr. Brown, I made no conversion on the American Cyanamid Company figures.

Q. What I am trying to get at, you merely took their figure--

A. That is correct.

Q. --as on suspended solids?

A. That is right.

Q. Now, admitting that the city and the industries are not required to treat suspended solids, I am trying to arrive at the amount of settleable solids which each one is producing, because those are the solids which must be treated. And do you have any figures whatsoever that you can point out accurately to this Board as constituting settleable solids?

A. I made no measure--

MR. STEIN: Mr. Chairman, before we answer that question, the witness answers that question, I think we are making no admission that the city be required to treat or not to treat suspended solids and I don't think for purposes of this record that the witness can properly at this point take that into consideration in the answer. I think the record should so show.

MR. BROWN: Mr. Chairman, I think counsel is entirely out of order. His own witness has already stated that the design here was for a primary treatment plant to treat settleable solids only and I don't think counsel can get up and say the witness was wrong. He put him on and vouched for him. I assumed the witness was correct when he said that is the situation.

CHAIRMAN SAMSON: Well, if Mr. Clare can answer the question, you go ahead and answer the question.

MR. BROWN: I asked him that question a while ago, if this plant wasn't designed to treat settleable solids only and he stated yes.

A. I think I stated that I understood that that was the type plant that was under discussion.

Q. (By Mr. Brown.) Yes, sir.

A. I am sure I don't know what type plant will be built, Mr. Brown.

Q. You never even heard it discussed that they should treat suspended solids, have you?

A. It has been discussed.

Q. Here in St. Joseph?

A. Yes.

Q. In the original conference was there any requirement that the city or industries treat suspended solids?

A. I don't know that it was in the conference.

Q. Well, that is in evidence, the result of that conference, and that provided for a plant for settleable solids only, didn't it? That is right, isn't it?

A. I am not thoroughly familiar with that. I wasn't at the conference.

Q. Haven't you studied that?

A. I have read it.

Q. You have read it? Isn't that what was proposed to do?

MR. BROWN: I think this man is capable of answering the question, Counsel. I don't think you have to prompt him.

MR. STEIN: He is not being prompted, sir.

A. I don't know what type of plant will be built at St. Joseph. I know that the primary plant has been under discussion.

Q. (By Mr. Brown.) All right. Now, you can see the position I am trying to clarify here so that everybody will understand it. There is a distinction between suspended solids and settleable solids, we will agree on that?

A. Some difference, yes.

Q. Yes. And a primary treatment plant treats only settleable solids?

A. Settleable and floating solids.

Q. And the percentage of settleable solids is not 100 percent of the suspended solids; in city wastes it runs down to about 50 percent and in industrial waste as little as 20 percent, doesn't it?

A. Well, it can vary widely.

Q. And you have offered no testimony on the percentage of settleable solids from any of these outfalls, have you?

A. I have not--that is right. I have estimated the suspended solids.

Q. Then my statement is correct, there is no testimony on settleable solids?

A. That is correct.

Q. All right, sir. Now, if you get down to the American Cyanamid itself, you have its gallonage there. It flows--it produces less flow to the river in a month than some of these city sewers produce in 24 hours, much less, doesn't it?

A. The Black & Veatch gave a flow as 200,000 gallons per day.

Q. 200,000 gallons per day?

A. I beg your pardon, 100,000. I am sorry. 100,000 gallons a day.

Q. Your '59 report shows American Cyanamid for the--if you will look at page 12--the water consumption in '58 for the entire year was approximately 30 million gallons, and according to Black & Veatch the use daily was 96,000 gallons. Page 12 of the exhibit.

A. I see. It is given on page 33 as 100,000 gallons, approximately the same.

Q. Well, 96 or 100?

A. Approximately the same.

Q. In other words, one city sewer produces more in a day than the American Cyanamid produces a month?

A. It depends on which sewer it is, I would think.

Q. Well, a number of them do, Blacksnake, Whitehead, Mitchell Avenue?

A. Right.

Q. All right, sir. And you have no figure to show the amount of settleable solids that American Cyanamid introduces into the river through this 6-inch main?

A. The only figure I have is the figure from the Black & Veatch Report.

Q. Now, in making your computations did you inquire of any of these industries as to what changes they had made, what abatement they had made in their offal, since the Black & Veatch Report?

A. No, I did not.

Q. You knew that they not only had made reductions prior to that report but are still working on it?

A. I assume they are.

Q. And what their output is as of today you do not know?

A. No, I did not go beyond the Black & Veatch Report for the industries covered by the consulting firm.

Q. Now, getting down to the Stockyard Sewer, the Stockyard Sewer before it is joined by the outlets from the yards is a 96-inch sewer, an 8-foot sewer, isn't it?

A. Well, let's see. That is correct.

Q. You can see it on the plat in the Exhibit (G) on the preceding page 8, it is a 96-inch sewer before it ever gets to the yards?

A. Yes, sir, that is correct.

Q. And after it is joined by the waste from the yards it still is a 96-inch sewer, isn't it?

A. That is correct.

Q. So it took a 96-inch sewer to take care of the discharge, both the waste and storm waters, from the residential district or the municipal district to the east of the yards?

A. Well, I presume it was properly designed. I don't have that information.

Q. Did you make any investigation as to the size of the area, of the municipal area, served by that sewer?

A. Yes.

Q. How large an area did you find it serves?

A. I don't have it in acres or in area. I did estimate the amount of waste introduced to the sewer from the municipal--

Q. It is a sizable area, isn't it?

A. Yes, it is.

Q. And when you get down to the Brown's Branch you had, I believe, an 8-foot sewer emptying into that from the municipal area, didn't you?

A. No, that was a double--

Q. Or was it 9?

A. --9 foot by 9 foot, double 9 by 9 foot box.

Q. That is right. So the municipal waste dumped into Brown's Branch before the industries reached it came from a 9-foot sewer?

A. A double 9 by 9 foot sewer.

Q. Double 9 by 9. And that served a large area, didn't it?

A. For storm drainage and surface water drainage and domestic waste.

Q. And domestic waste. Now, have you any way of dividing the amount of separable solids that are introduced into the Missouri River from either the Stockyards Sewer or Brown's Branch as between industry and the municipality?

A. I can estimate it.

Q. How would you-- In the first place, how would you make your computations?

A. I would estimate the number of people served in the municipal area in each instance and then estimate the solids, suspended solids, contributed by that population, and then having a figure for the total discharge from that sewer they can be separated or subtracted.

Q. Then you would arrive at a figure of suspended solids?

A. Correct.

Q. And to arrive at the further figure of the separable solids or the settleable solids, you would take 50 percent of the suspended solids?

A. I am not sure that I would.

Q. Isn't that approximately the figure that is used?

A. Well, I wouldn't say so without checking it further.

Q. Well, then we couldn't go any further on your computations because you wouldn't have the factor to use on separable solids at this time?

A. I see.

Q. That is correct, isn't it?

A. It is up to you, sir.

Q. It is not up to me. You are the witness. I am asking you. If you have the factor I want to use it. If you can't use the factor, I don't want to use it.

A. I can't use a factor.

Q. All right, sir, then we can go no further on that. All being said, then, to this Board is that those two sewers dump waste which is commingled from several sources and what the percentage from either one is of settleable solids you do not know?

A. No, I can give them suspended solids.

Q. All right, sir. Now, were you on the boat ride yesterday?

A. Yes, sir.

Q. You have obviously been in this work a long time and are experienced and you understand how industrial waste is produced. At the time we inspected the industrial sewers yesterday it was in the daytime while the industries would be operating, that is correct, isn't it?

A. I assume so.

Q. And, therefore, the highest peak of their industrial waste would be being produced at that time?

A. That is possible.

Q. Domestic waste--and correct me if I am wrong--is generally introduced in the morning and in the evening?

A. Well, in the morning, near noon and in the evening, I think there are three peaks.

Q. And in the evening. So we hit those sewers when the industries would be at the most disadvantageous position?

A. Well, I wouldn't say most disadvantageous.

Q. Well, would you say--

A. I think at night the waste from the industry would certainly be less.

Q. All right.

A. The waste from the domestic sewers should be high near noon, soon after noon.

Q. Do you think people are home generally in the daytime and the women are doing their washing by noon and all that? Do you think that is when domestic waste is produced?

A. The domestic wastes were probably reaching the outfalls at about that time from a peak.

Q. About noon?

A. Yes, sir, that is right.

Q. When we got down there at around 2 or 3 o'clock we were a little late for the peak?

A. Well, might have been for the peak, but there was still plenty of it.

MR. BROWN: I believe that is all. Thank you.

CHAIRMAN SAMSON: Any further cross-examination by any of the other interested parties?

MR. WILCOX: Mr. Chairman.

CHAIRMAN SAMSON: Yes.

MR. WILCOX: I have a couple of questions.

## CROSS-EXAMINATION

BY MR. WILCOX:

Q. In referring to the St. Joseph Light & Power Company you said you noticed some milky white liquid from their drainage. Do you consider that that milky white substance that you saw or liquid was contributing to the pollution of the river?

A. Well, it is a factor. It is certainly small, I mean compared to the others, but there are solids there that would be retained by a sewage treatment plant if it discharged to such a plant.

Q. Do you consider those as settleable solids?

A. Yes, I would think so.

Q. Did you make any tests--

A. No.

Q. --whether there was any poisonous material in that?

A. No, I made none.

Q. Did you observe when they entered into the river, this white milky substance you were talking about, how long it took it in flowing into the river before it was not noticeable any longer?

A. No, I didn't.

MR. WILCOX: That is all.

CHAIRMAN SAMSON: Any further cross-examination by any of the other interested parties?

Members of the Board? Dr. Martin? Mr. Poole? Mr. Johnson? Mr. Kurylo?

And I have none.

Any further redirect?

## REDIRECT EXAMINATION

BY MR. STEIN:

Q. Mr. Clare, I would like to refer your attention to Government Exhibit No. 9, the Summary of Conference. Would you please get that? Would you refer to page 5? Would you refer to Item 6 on page 5? Would you read that item?

A. Item 6?

Q. Yes.

A. "That the City of St. Joseph, Missouri, and the industries of its associated stockyard district provide adequate treatment of wastes prior to their discharge."

Q. Would you say that that makes a recommendation for primary treatment, secondary treatment or any other specific type of treatment?

A. It does not.

Q. Mr. Clare, in your experience as a sanitary engineer have you ever run into situations where a multitude of small sources of pollution, such as individual households, which in and of themselves may not have created a big problem, when added together in a large group created a problem?

A. Very often.

Q. Now, Mr. Clare, I was very interested in this discussion of suspended and settleable solids. On the basis of your studies, observations and investigations are all these suspended solids and settleable solids both now being discharged into the river?

A. They are.

Q. Are they contributing to pollution, in your opinion?

A. In my opinion they are.

MR. STEIN: No further questions.

CHAIRMAN SAMSON: Any further cross-examination?

MR. SCHOENLAUB: Yes.

## RECROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Clare, what, in your opinion, would be adequate treatment of this sewage prior to discharge into the Missouri River?

A. Well, I don't think that I should--I am not the person to decide that, sir.

Q. Well, you have testified as to the fact that primary, secondary, and so forth, would not necessarily mean adequate. You have stated that the sewage as it is now being discharged into the river does constitute pollution and that it should be treated. In what way should it be treated?

A. Well, I can tell you that based on the comprehensive program that has been adopted by the--

Q. No, what in your opinion, since this has all been--most of this evidence has been based on your opinion--what in your opinion would be adequate treatment prior to discharge of this particular sewage you have been referring to throughout your testimony?

A. Well, it depends on many water uses downstream, some of which--

Q. You have testified as to the uses downstream?

A. Well--

Q. Based on those uses and based on the type of sewage coming both from the municipality and the industries and the type of pollution that is being caused by that, what, again, in your opinion would be adequate treatment prior to discharge to prevent the pollution that you referred to?

A. Well, I should think that it should be a higher degree of treatment than primary treatment.

Q. In what respect?

A. Besides removal of substantially all the suspended solids, floating and settleable, that the strength of the waste should be further reduced.

Q. In other words, if the city and the industries had gone along with the possibly informal discussions with health officials and built a primary treatment plant, that still would not be adequate and we would still be in violation?

A. No, I wouldn't say you would be in violation.

Q. Well, then, primary treatment would be sufficient?

A. Well, I started to refer a while ago to the standards which would determine the violation. As I understand it, the--

Q. In other words, the standards aren't high enough?

A. Well, I don't think they will be lowered. I wouldn't be surprised but what they would be raised.

Q. With primary treatment what would be the state of the sewage being discharged into the Missouri River?

A. Primary treatment would remove substantially all of the settleable and floating solids.

Q. Would the sewage being then discharged into the river constitute pollution of the Missouri River?

A. Well, I have no basis for answering that.

Q. You had a basis for stating opinions on every other phase of this alleged pollution--

MR. EDELMAN: Mr. Chairman, I submit that that is an argumentative statement by counsel.

MR. SCHOENLAUB: I am just trying to get him to go on--

MR. EDELMAN: He said he had no basis for it.

MR. SCHOENLAUB: --Your Honor, with his opinion on the various aspects of this pollution.

CHAIRMAN SAMSON: What is the question, Miss Reporter?

(Question read as follows: "You had a basis for stating opinions on every other phase of this alleged pollution--")

Q. (By Mr. Schoenlaub.) --so what is your opinion concerning the state of this sewage?

A. Well, it is my opinion that some water uses would still be interfered with.

Q. Specifically what water uses?

A. Well, it would certainly affect water supplies. Without chlorination I think there would still be some restrictions on the use for recreation immediately below St. Joseph.

Q. So that if, in other words, the city and the industries had complied with the requests of the health officials in providing primary treatment, at least two, recreation and water use, would still be interfered with?

A. In my opinion they would.

Q. How would it affect the use of the Missouri River by the St. Joseph Yacht Club you have referred to?

A. Well, there is some recreational use by Yacht Club members. It--

Q. And again in the charges made against the city the stated purpose is that we are interfering with the use by persons in other states. In what way does any possible interference with the activities of the St. Joseph Yacht Club fit into that charge?

A. I don't--

MR. EDELMAN: I object to the question, Mr. Chairman. There has been no showing of any use of the river by the St. Joseph Yacht Club or any interference with the use of the river by the St. Joseph Yacht Club.

MR. SCHOENLAUB: Your Honor, there has been reference to it three or four times in his testimony.

CHAIRMAN SAMSON: Your objection is overruled. And if the witness can answer, he may answer.

A. I can't answer it. I don't know who they are, what the effect would be.

Q. (By Mr. Schoenlaub.) You don't know whether the members of that Club are Missourians or Kansans?

A. No, I don't.

Q. With primary treatment would the use of the river for stock watering still be interfered with?

A. I shouldn't think so.

Q. In what way would it be interfered with without primary treatment or is it being interfered with at this point?

A. Stock watering?

Q. Yes.

A. Well, primary treatment would substantially reduce the bacterial discharge.

Q. I mean now, in what way?

A. Bacteria and--

Q. And that would be removed with primary treatment?

A. It would be reduced.

Q. It would be reduced to what extent?

A. Well, I can't give you that figure.

Q. Again because you have no information concerning the amount of solids that would be removed by primary treatment?

A. Well, we were talking about bacteria, weren't we, sir?

Q. Yes.

A. No, I don't have.

Q. Would there be any bacteria removed with primary treatment?

A. Yes.

Q. To what extent?

A. I can't give you the figure on that. I don't have it.

MR. STEIN: Mr. Chairman, we will have people who are fully qualified to testify as to the removal of bacteria subsequent to Mr. Clare.

CHAIRMAN SAMSON: Very well.

Q. (By Mr. Schoenlaub.) In what way is the alleged pollution at St. Joseph creating conditions inimical to fish and wildlife in the area and affecting the people of the State of Kansas?

A. I can't answer that question. I have not studied that.

Q. If there is a problem created there, in what way would primary treatment solve that problem?

A. Well, I don't believe I could answer that until I knew what the problem was.

Q. And you don't know whether there is any problem there or not?

A. No, sir.

Q. And you don't know in what way such sewage would create conditions inimical to fish and wildlife?

A. Not in the Missouri River.

MR. SCHOENLAUB: I have no more questions.

CHAIRMAN SAMSON: Any further questions by any of the other interested parties?

MR. BROWN: I have just one question.

Q. (By Mr. Brown.) You would agree, would you not, that all the plans of Black & Veatch, all their specifications, everything that was to be submitted to the voters and with which the Government indicated they were satisfied, they all pointed towards a primary treatment plant?

A. That is what I understand.

MR. BROWN: That is all.

## RECROSS-EXAMINATION

BY MR. WILCOX:

Q. Mr. Clare, I asked you a moment ago about whether you considered this milky white substance from the Light & Power Company Lake Road Plant was contributing to pollution of the river, and I have noticed in most of your testimony you have been referring to this most recent Black &

Veatch Report, which I did not have a copy of and do now. Do you personally accept the conclusions that are contained in that exhibit in the latest Black & Veatch Report?

A. For the most part, yes. I don't recall anything that I have taken any great exception to.

Q. Now, as far as the St. Joseph Light & Power Company is concerned, and for that matter Union Terminal Railroad--

A. Yes.

Q. --would you agree with their conclusion that those concerns would not be concerned in any community treatment facility in this industrial area?

A. Well, that I can't answer because that would have to be determined, I should think, by the company's consulting engineers.

Q. What companies?

A. Well, the St. Joseph Power & Light Company. Because what a company does with its waste is primarily its responsibility, and if the company determines that it can treat its own wastes and dispose of them properly and most economically, I don't think anyone would have any objection to that.

Q. So you are not willing to say whether you agree with that part of the latest Black & Veatch Report or not?

A. I certainly have no disagreement with it.

MR. WILCOX: Thank you.

A. I have no responsibility for it.

CHAIRMAN SAMSON: Any further cross-examination by any of the interested parties?

Members of the Board?

I have just one question or two, Mr. Clare.

Q. (By Chairman Samson.) What is the size of the diameter of the sewer that comes down Packers Avenue, if you know?

A. I would have to take it from the Black & Veatch Report.

Q. That will be all right.

A. It is given as a 42-inch brick sewer north of Illinois Avenue. South of Illinois Avenue it is a 36 inch sewer.

Q. That is about 3 feet?

A. 3 feet.

Q. Or 3 feet 6 inches, is that right?

A. That is correct.

Q. And that ties into the Stockyard Sewer that you have indicated as being M-18 on Exhibit 13?

A. I intended and I think I described that intersection as being near-- I mean the point as being near the intersection of Packers Avenue with Lake Road.

Q. I see.

A. It is north and west of the Seitz Packing Company, which is I-13. It is north of the Terminal Warehouse Company, which is I-17. And between Kees-Lyons and Albers Milling Company, which are I-9 and I-1 respectively.

Q. In other words, the Packers Avenue Sewer is 42 inches in diameter where it ties into the Stockyard Sewer, which is 8 feet in diameter, is that right?

A. The Stockyard Sewer is 8 feet in diameter. Black & Veatch shows a short section of 36-inch sewer near the connection.

Q. And that is the sewer that is commonly referred to as the--

A. Packers.

Q. --Packers Avenue Sewer?

A. Packers Sewer, yes, sir.

Q. Now, I am a bit confused on the American Cyanamid. Are there two lines from that industry that come into the Missouri River?

A. There are two lines, as described by the company officials. The map, Exhibit 13, shows these two lines as being separated by approximately 20, 30 yards, and I have been advised by the company that according to an "as installed" map of their area that these two lines are close together. There are two lines. One is above the other.

Q. Did you observe those two lines in your investigation in May of 1959?

A. I did not observe the line except the one carrying the wastes from the laboratory and the pens. I did not see the outfall of the other. I had a description of the area, but it was not accurate.

Q. I see. Would you relate again what, if anything, you observed?

A. At the point designated as I-8 there are three lines discharging, according to the present information. Two of these are from the American Cyanamid Company and one is from Dannen Mills, all discharging very close together.

Q. What was the nature of the discharge? What did you notice, if anything?

A. The discharge from the laboratory was brown in color and obviously quite a strong sewage, although the volume wasn't very great at the time of the observation.

Q. What time of the day did you make those observations, if you recall?

A. Oh, on one occasion it was in the morning and another it was in the afternoon.

CHAIRMAN SAMSON: I have no further questions.

Any further questions?

MR. BROWN: Mr. Chairman, perhaps I can explain this.

Mr. Clare, I don't know whether you know this or not. The lower outlet, which is the 12-inch, is a gravity outlet which is used when the river is low. When the river gets up to the 8-inch pipe above it, a pump is then put on that and they use the 6-inch pipe to force it out.

THE WITNESS: I see.

CHAIRMAN SAMSON: Very well. Thank you, Mr. Brown.

Anything further?

You may be dismissed, Mr. Clare.

(Witness excused.)

CHAIRMAN SAMSON: Gentlemen, I have just been advised that the Notary has returned to do the necessary and I also have the further information that the United State Government has had some witnesses come in who were not sworn yesterday. I wonder, could we dispense with that matter now so that the Notary may be discharged?

MR. STEIN: Yes.

Dr. Ingram, Dr. Ryckman, Mr. Hartung, Mr. Fisher and Mr. Smith.

(Witnesses sworn.)

CHAIRMAN SAMSON: You may proceed, Mr. Stein.

MR. STEIN: Dr. Ingram.

DR. WILLIAM M. INGRAM,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. STEIN:

Q. Dr. Ingram, may we have your name and address?

A. It is William M. Ingram, 6640 Elm Street, Cincinnati 27, Ohio.

Q. Dr. Ingram, you recall that you have been previously sworn and your testimony is under oath?

A. Yes, sir.

Q. By whom are you employed?

A. I am employed by the Division of Water Pollution Control housed in Cincinnati at the Robert A. Taft Engineering Center.

Q. What is your position?

A. I am in charge of biological field investigations.

Q. Have you had any specialized training?

A. Yes, sir. I majored in zoology for a Bachelor's Degree at Pomona College, took a Master's Degree in zoology at the University of Hawaii, and the Ph.D. Degree at Cornell University in zoology.

Q. Did you ever teach at the college level?

A. Yes, I taught a number of courses, amongst which were pre-vet zoology, comparative anatomy, and anatomy and physiology.

Q. Did you personally make an inspection of sewer outfalls on the St. Joseph water front?

A. Yes, sir, on June 10 and 11, 1959, by boat I made a personal inspection of the outfalls at their confluence with the river.

Q. Will you describe what you have seen at this outfall, at the outfall you have been at?

A. May I refer to some notes?

Q. Yes, by all means.

A. Thank you. Going to Brown's Branch, the confluence of Brown's Branch at the river was sampled at 8:55 a.m. on June 10, 1959.

Q. Did you sample it?

A. I sampled this personally.

Q. What kind of sample did you take?

A. We took dredge hauls, getting bottom decayed muck and other materials, then we used or I used hand nets of various sorts to determine what was flowing out of Brown's Branch being discharged into the Missouri River.

Q. Do you have any of that material with you?

A. Yes, sir.

Q. May I see it?

A. Yes, sir. These are two samples from Brown's Branch.

Q. How would you describe this? Is this a Mason jar?

A. A small Mason jar.

MR. STEIN: I ask that this small Mason jar be labeled Government Exhibit No. 15 for purposes of identification.

(Government's Exhibit No. 15 marked for identification.)

Q. (By Mr. Stein.) Exactly where and how did you get the material in this jar?

A. The material in the current exhibit was collected by a hand-dip net in water floating out of Brown's Branch into the Missouri. The prow of the boat was put up into the Branch. This was collected by dipping over the side with a well-established hand net that is highly marketed over the United States for zoological biological collecting of materials.

Q. Based on your studies of anatomy, can you identify this material?

A. Yes. It is an animal viscera, a large intestine area, a segment.

Q. Does this material look exactly as it did when you got it out of the Brown's Branch?

A. It is cleaner. The material was preserved in formaldehyde immediately so it wouldn't decay and then transferred the following Sunday after June 10th into alcohol, which smells much better.

MR. STEIN: I offer this as Government Exhibit No. 15.

CHAIRMAN SAMSON: I believe start with Mr. Johnson down at the other end. He can pass it on down this way.

Are you offering that, Mr. Stein?

MR. STEIN: Yes, sir.

CHAIRMAN SAMSON: Are there any objections to the exhibit?

MR. BROWN: No objection.

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 15 received in evidence.)

Q. (By Mr. Stein.) Do you have any further materials you collected?

A. Yes, sir, other material that is identifiable as fat--

Q. No. Where is this material contained?

Q. This material is contained in the small Mason jar on the table.

MR. STEIN: I ask that this Mason jar be identified as Government Exhibit No. 16 for purposes of identification.

(Government's Exhibit No. 16 marked for identification.)

Q. (By Mr. Stein.) Where and how did you get this material, Dr. Ingram?

A. This material was taken by a hand-dip net coming out of the confluence of Brown's Branch with the Missouri.

Q. What date was this?

A. This was taken on June 10, 1959.

Q. Would you think on the basis of your experience you could identify this material.

A. Yes, sir. It is a fatty material associated with animal membrane related to the viscera in the body cavity.

MR. STEIN: I offer this as Government Exhibit No. 16.

CHAIRMAN SAMSON: Are there any objections to Exhibit No. 16?

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 16 received in evidence.)

Q. (By Mr. Stein.) Dr. Ingram, based on your observations, is this material typical of the material at Brown's Branch during the date you made the--got these samples?

A. The two exhibits represent typical material that was flowing out of Brown's Branch into the Missouri. Going past the boat this material could be reached with these short dip nets. They didn't have to be searched for.

Q. Do you have any other material?

A. I have another jar of material from the discharge ditch of the Stockyard Sewer area further upstream.

Q. May I have that jar? This is the same small-sized Mason jar

A. That is right.

MR. STEIN: I ask that this be marked for identification purposes as Government Exhibit No. 17.

(Government's Exhibit No. 17 marked for identification.)

Q. (By Mr. Stein.) Exactly where did you get this material and how did you get it?

A. This material was collected at 9:35 a.m. on June 10, 1959, by putting the bow of the boat up into the confluence of the discharge into the Missouri River, collecting the material, that is a combination of dredge material, from the bottom of this Stockyard Sewer ditch, if I may call it that, with the dip net.

Q. On the basis of your experience could you identify the material in that jar?

A. The materials in that jar are a heterogeneous variety of things, including hair, corn, and something appearing similiar to stomach contents or intestinal contents of herbivorous animals.

MR. BROWN: Paunch material, in other words?

A. This could be true, sir, or stomach material.

MR. STEIN: I offer this as Government Exhibit No. 17.

CHAIRMAN SAMSON: Any objections to Exhibit 17?

MR. BROWN: No objection.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 17 received in evidence.)

Q. (By Mr. Stein.) Dr. Ingram, was this typical of the material coming out of that sewer when you observed it?

A. This was typical of the material coming out of the sewer when it was observed.

Q. Dr. Ingram, based on your work at the Robert A. Taft Sanitary Engineering Center, are the materials in the Mason jars which we have introduced as Government Exhibits 15, 16 and 17 the kind of material removed by treatment when the city has a treatment plant or the industries have treatment works?

A. Yes.

MR. STEIN: No further questions.

CHAIRMAN SAMSON: Any cross-examination by either the States of Kansas or Missouri?

The City of St. Joseph?

MR. SCHOENLAUB: No questions.

CHAIRMAN SAMSON: Industry, Mr. Brown?

MR. BROWN: No questions.

CHAIRMAN SAMSON: Any cross-examination by any of the other interested parties?

Any questions by members of the Board?

I believe that closes this phase of the matter.

(Witness excused.)

MR. STEIN: Dr. Walton.

DR. GRAHAM WALTON,
called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Dr. Walton, will you give your name and home address, please?

A. Graham Walton, 3824 Homewood Road, Cincinnati 27, Ohio.

Q. I remind you, Dr. Walton, that you were sworn yesterday and the testimony you are about to give is subject to that oath?

A. I do, yes.

Q. By whom are you employed, Dr. Walton?

A. The Robert A. Taft Sanitary Engineering Center of the U. S. Public Health Service, Department of Health, Education and Welfare.

Q. Will you tell us generally the duties of your position there?

A. For the last about five years I have been in the water supply unit. During this period I have been in charge of some water treatment evaluation studies and water conservation studies.

Q. What do you mean by water treatment, Dr. Walton?

A. My studies here specifically involve the collection and analysis of data from water treatment plants. During the course of collecting the data I visited some 80 to 100 water treatment plants throughout the United States.

Q. What other positions have you held in the Public Health Service?

A. Prior to being assigned to the Public Health Service station in Cincinnati I spent four years with the Federal Bureau of Prisons. Preceding that a year as sanitary engineering consultant to the Federal Public Housing Authority, San Francisco Region. Preceding that I was at the Regional Office of the Public Health Service for slightly less than a year in Denver, Colorado.

Q. Prior to that employment did you have any experience in the field of water supply?

A. I have had a total of 13 years teaching in the field of civil and sanitary engineering, five at the State School of Mines, Rapid City, South Dakota, and 8 at the University of Wisconsin. Among other subjects I have taught water treatment.

Q. In the course of your education and experience, Dr. Walton, have you become familiar with the method of operation of water treatment plants and the problems they face in producing a safe and potable water for consumption?

A. I believe I have.

Q. Did you also become familiar with the health hazards presented by using polluted water as a source of public water supply?

A. I certainly have been interested in this and have collected substantial information on it.

Q. Will you tell us, Dr. Walton, what means is generally employed in the United States to treat water which is taken from a surface source?

MR. BROWN: Your Honor, I would object to that unless it is confined to water taken from sources similar to the sources here.

MR. EDELMAN: I will accept the amendment.

MR. BROWN: I don't think the whole problem should be gone into.

MR. EDELMAN: I will accept that amendment, Mr. Brown.

CHAIRMAN SAMSON: All right.

Q. (By Mr. Edelman.) Sources such as the Missouri River?

A. You are speaking of a source which has substantial pollution?

Q. Yes, I am.

A. Processes very somewhat, but in general they include coagulation, sedimentation, and disinfection. Sometimes you may have multiple stage coagulation and sedimentation, such as most of the plants on the Missouri River have. You may also have multiple point chlorination. Again most of the plants in the Missouri River seem to have two or three stage disinfection.

Q. Would plants such as these also include a stage I understand is called filtration, Dr. Walton?

A. Did I omit filtration?

Q. I thought so.

A. In practically all treatment plants treating a surface water it is essential, in my opinion, to have filtration and it is a rare exception that they do not.

MR. BROWN: Well, now, I don't understand. Pardon me for interrupting. Are you talking about water works or--

A. I am talking about water works, rapid sand filtration.

MR. BROWN: Well, all right, so we understand.

Q. (By Mr. Edelman.) What is the purpose of the addition of chlorine to water supplies?

A. The purpose of addition of chlorine is for disinfection or the destruction of pathogenic organisms.

Q. Under what circumstances is multiple stage chlorination utilized?

A. Multiple stage--what, coagulation, you say?

Q. Chlorination.

A. Oh, multiple chlorination has, in my experience, been utilized largely at those water treatment plants treating a more heavily polluted water.

Q. What happens to chlorine that is added to a heavily polluted water?

A. The chlorine added to the water is used in part to oxidize organic matter. It will combine with ammonia and also to destroy or inactivate bacteria and other pathogenic organisms.

Q. Is the amount of chlorine that is added in this type of treatment related to the degree of pollution of the water?

A. The amount of chlorine applied to water tends to increase substantially at the plants where they treat heavily polluted waters.

Q. Now, in adding chlorine for the purpose you have described, Dr. Walton, is it the general practice to add just enough chlorine to achieve this result or is any excess amount added?

A. This is something that may depend on the particular plant involved. Also on the attitude of the State Health Departments. There are plants in this country that treat waters that work on somewhat of a marginal proposition. There are other plants that will apply chlorine in sufficient amounts to have a substantial free residual chlorine in the plant effluent.

Q. What is the purpose of the residual free chlorine in the plant effluent?

A. The object of using a free residual chlorine in a substantial amount in a plant effluent is largely one of providing insurance from the health standpoint, insuring a safe water.

Q. Dr. Walton, in the course of your official duties have you had occasion to visit and inspect the water treatment plant at Atchison, Kansas?

A. I have.

Q. When did you do that?

A. May 5, 1959.

CHAIRMAN SAMSON: Mr. Edelman, if I may interrupt you, I believe that it is about time for a little recess, about 15 minutes or so.

(RECESS)

**CHAIRMAN SAMSON:** Gentlemen, the hearing will come to order.

I might say now, for the benefit of all you gentlemen, that there will be a recess from 12 to 2 today during the lunch hour. Tomorrow we have a problem in view of the fact that a very good friend, a very good relative, of one of the counsel involved in this hearing has passed on and his funeral is tomorrow and he will be excused and the hearing will be adjourned tomorrow from 9:40 to 10--until about a quarter of 11. And if possible, we could start with this hearing at 8:45 in the morning. However, that is subject to you gentlemen.

I understand that the Government has some witnesses that must be put on the stand today and we will work as late as conveniently necessary to accommodate the Government so that they may proceed with the testimony that is available here today. Thank you.

You may proceed. Mr. Stein.

Q. (By Mr. Edelman.) Dr. Walton, you indicated before the recess that you visited the Atchison water plant on May 5, 1959?

A. Yes.

Q. What is the source of raw water for that plant?

A. The Missouri River.

Q. Will you describe the kind of treatment that the Atchison water plant provides?

A. Very briefly, the Atchison water treatment plant provides treatment consisting of presedimentation, chlorination, two-stage coagulation and sedimentation, filtration, and postchlorination. I am not sure that at all times they operate both stages of the coagulation-sedimentation, I mean the addition of chemicals in each stage.

Q. Could you characterize this degree of treatment as high, average or low?

A. Compared with the more typical plant it is a high degree of treatment.

Q. Did you familiarize yourself with the amount of chlorine that is added to water in treatment by that plant?

A. I reviewed briefly the records for the previous year.

Q. Will you tell us what that record disclosed with respect to the addition of chlorine?

A. The chlorine, total chlorine, added at the plant varied from about 2-1/2 to 12-1/2 milligrams per liter, averaged around 5 milligrams per liter.

Q. Based on your knowledge of the practices of other water treatment plants using river waters polluted in a condition similar to that of the Missouri, do you consider this level of chlorination to be high or average?

A. I should like to modify my answer slightly. I have had the opportunity during the past few years to make a study of water treatment plants that were treating raw waters considered to be heavily loaded as indicated by coliform bacteria. I collected data and analyzed it from some 50 water plants scattered throughout the United States. The average chlorine application of all these--no, the median chlorine application of all these plants was about 3.4 milligrams per liter. At Atchison the average for the year was around 5, roughly 50 percent more than the mean of the plants that I visited.

Q. To what do you attribute this higher level of chlorine at Atchison?

A. To two things. One is the objective that they have of carrying approximately eight-tenths free residual chlorine in the plant effluent. The other is that they are treating a water somewhat more polluted than the average water of the plants that I studied.

Q. This eight-tenths free residual, Dr. Walton, represents a high or average level of residual chlorine?

A. There are very few plants in the United States that will carry that high a free residual chlorine in the plant effluent.

Q. To what do you attribute this high level?

A. To a desire to insure a safe water.

Q. Have you been advised or informed of the level of coliform bacteria reported at the water intake of the Atchison plant?

A. I have.

Q. Can you tell us what it is?

A. I will have to refer to my notes. The data supplied to me indicated that the coliform density in the raw water at the intake of the Atchison plant is approximately 50,000 per 100 milliliters.

Q. Dr. Walton, what does that level of coliform indicate with respect to the quality of the raw water?

A. I consider the coliform density as an indicator of sewage pollution. This is rather substantial sewage pollution.

Q. Do you consider that water which is so polluted constitutes a desirable source of water supply?

A. No.

Q. Why not?

A. Who wants to start with sewage polluted water as their source of water? Also the higher the degree of sewage pollution the more chance there is of something getting through the water treatment plant.

Q. Do you consider this, then, to represent a health hazard?

A. It certainly increases the possibility of an outbreak, possible outbreak, of disease that might be water-borne.

Q. Are you familiar with the number of staff employed at the plant?

A. I have some information.

Q. Can you tell us what that indicates?

A. I understand that on a 24-hour operation basis they would have two men on the day shift and one man on each of the other two shifts.

Q. Does the application of chlorine to water in a treatment plant such as the Atchison plant require supervision?

A. No equipment is completely self-operating. It always requires some attention and checking to make sure that it is properly operated.

Q. Are you aware in your experience and your knowledge of the field of instances where treatment plants which were otherwise effective in providing a safe water supply have experienced mechanical or human failures which have resulted in the introduction of contaminated water into a public water supply?

A. There have been such instances reported in the literature and I have known of some such instances mentioned by plant operators.

Q. Do you consider that such a possible failure of men or machines is a hazard in the operation of the Atchison water plant?

A. I consider any operation that runs on a 24-hour day, providing the plant operates continuously 365 days a year, always subject to the possibility of mechanical or human failure.

Q. Does the Atchison plant operate 24 hours a day?

A. It does at times. I doubt if it operates 24 hours a day 365 days a year, but whenever the plant is operating this possibility could occur.

Q. Now, you testified earlier as to the level of coliform contamination at the water intake. If this level could be reduced, in your opinion would the health hazard that you have described be reduced?

A. I would consider the level of sewage pollution in the raw water an indicator of the possibilities of infectious material going through the plant, particularly providing a breakdown or human error occurred.

Q. Does the utilization of a source of raw water as polluted as the Missouri River is at Atchison create problems other than the removal of coliform bacteria by chlorination?

A. It does. There is always the taste and odor problem present in all water plants, more or less. I should modify that. Not in all water plants, but many water plants experience this. There is no question that sewage may be in some cases a cause of taste and odor. It is not in all cases.

Q. On the basis of your knowledge and experience, can you tell us whether chlorination in the treatment of water as heavily polluted by sewage as the Missouri is at Atchison, Kansas, a guarantee of destruction of all pathogens that may be in the water?

A. Based on my knowledge, I would say that chlorination as effected at Atchison should take care of all bacterial pathogens. Our information on virus is somewhat limited. I would hesitate to say that even this treatment would take care of all virus.

Q. Did you visit the water treatment plant at Leavenworth, Kansas, Dr. Walton?

A. I did.

Q. When?

A. May 4, 1959.

Q. Will you tell us the nature of the treatment provided by that plant?

A. It is quite similar to that at Atchison. They were in the stage of some construction. I believe on completion of the construction there will be presedimentation, two-stage coagulation and sedimentation facilities, maybe not both stages operated, that is I should say chemicals added in each stage. They will use excess lime softening, filtration, and there are two points, I believe, of application of chlorine, pre and post. Final chlorination also includes the addition of ammonia.

Q. Will you tell us whether, in your opinion, the level of chlorination at this plant is high or average?

A. The application of chlorine at this plant varies between four and five milligrams per liter most of the time. This is an average, the average is in that range.

Q. Does your characterization average apply to the level of postchlorination?

A. This is total chlorine applied, not the residual. This includes the chlorine applied both in prechlorination and in the postchlorination, that used at the water treatment plant.

Q. Is the level of chlorination at the prechlorination stage average?

A. The data I have indicate that about 2.3 milligrams per liter, I think, is applied as prechlorination.

Q. Is that the average for plants treating polluted water such as the Missouri River?

A. I have no average for a single point.

Q. I see.

A. My average is total chlorine application in general.

Q. Did you learn of the level of coliform present at the intake of this plant?

A. The information I have indicates--I have two values, two average values for periods. One was around 40,000 per 100 milliliter, the other coliform density is around 24,000 per 100 milliliter.

Q. Is that a high level?

A. I would consider this still a substantially high level.

Q. Does that level indicate heavy sewage pollution?

A. I would say this level indicates substantial sewage pollution.

Q. In your opinion does this level of pollution at the intake present a health hazard in the use of the Missouri River as a source of water supply?

A. Yes.

Q. Did you visit the Kansas City, Kansas, water plant?

A. I did.

Q. On what date?

A. On May 4; and I have previously visited the plant at various times in the past, not recently, but I am quite familiar with the Kansas plant.

Q. That was May 4, 1959?

A. This is the Kansas City, Kansas, plant, on May 4, 1959.

Q. Will you briefly describe the treatment facilities that plant provides?

A. The facilities include presedimentation, coagulation, sedimentation. By the way, there is chlorine added at--no, then chlorination. Again they have facilities for a second stage coagulation and sedimentation, and postchlorination. This again provides multiple stage coagulation-sedimentation, facilities for at least two or three point addition of chlorine.

Q. Can you describe the facilities that plant provides for chlorine application?

A. Beyond their point of what I term prechlorination, after about 30 minutes contact time they sample the water with a continuous residual chlorine recorder. They aim to supply sufficient chlorine so as to have a residual at a given level. This residual is varied between 2 and 3 milligrams per liter during the daytime and is maintained between 1 and 2 milligrams per liter at night. I believe the equipment has an alarm system on it in case the residual falls below the pre-set level.

Q. Can you tell us the level of chlorine application at that plant?

A. The total chlorine application at that plant averages very close to 6 milligrams per liter, that is both pre and post.

Q. Is that an average level?

A. This is an average level for that plant.

Q. Does that plant have facilities to provide a higher level of chlorine application?

A. Yes, they can provide double that if they need to and they undoubtedly at times apply substantially more than 6 milligrams per liter.

Q. What do facilities of this kind and the level of chlorine application, together with the precautions taken by the plant to insure a safe water, indicate to you with respect to the quality of their water supply?

A. I might answer that by going back to some of the previous picture on water pollution. At the time of the Streeter Studies the average water treatment plant or the average water treatment facilities consisted of coagulation, sedimentation, filtration, and marginal postchlorination. These studies can handle a coliform density of around 5,000 in the raw water. With a coliform density such as we have at Kansas City I would not want to provide--such treatment, in my opinion, would be completely inadequate. In other words, additional treatment is essential to insure the safety of water.

Q. And that--

A. It must be on a continuous basis. It can not be interrupted.

Q. And these precautions are required because of the level of pollution of the Missouri River at Kansas City, Kansas?

A. I would say yes.

Q. Did you learn of the coliform levels reported at the water intake of the Kansas City plant?

A. The information I have is 70,000 per 100 milliliter for a 35-month average between '55 and '58, and, in some more recent work, the average coliform density for a winter period is about 50,000 and for a spring period about 35,000 per 100 milliliter in each case.

Q. How would you characterize these levels of coliform?

A. I would consider them indicators of substantial sewage pollution.

Q. In your opinion do they indicate the existence of a health hazard to persons using the Missouri River as a source of water supply?

A. They certainly increase the potentialities of a health hazard if any failure in the water treatment should occur.

Q. If these levels were to be reduced, would the health hazard be reduced?

A. I will go back again to the typical plant as studied by Streeter. If you had a coliform density not exceeding 5,000 per 100 milliliter, if a failure should occur in the prechlorination at the Kansas City, Kansas, plant I believe that postchlorination alone, with the other treatment, could probably handle it. I would not necessarily recommend such, though.

Q. Dr. Walton, does the application of chlorine as a residual to water affect its palatability?

A. There are many different waters. There appear to be some waters that chlorine in certain amounts definitely create a taste and odor problem. There appear to be some waters that chlorine can not control this taste and odor problem. Certainly in some cases the addition of chlorine can create taste and odor problems. Not the chlorine itself, it is the chlorinated products that were in the water that caused the taste and odor problems.

Q. Will chlorine itself, if added to finished water, produce a problem of taste and odor, if added in high amounts?

A. In high-- I think I can only answer that by my personal experience. We all vary on our capacity to detect taste and odor. I have had municipal waters that I have been informed contained a chlorine residual of 1 milligram per liter free chlorine. I could not taste it in the water. I could smell it if I put my nose in the glass. We also carried out some experiments in our own laboratory in which we put a chlorinator on our drinking water line and we boosted the chlorine gradually to the point where we began to get complaints. Some people detected it at a level, I think, of around 1 or maybe less milligram per liter, other people did not object very much about it until it hit around 3 milligrams per liter. This is a variable thing with the individual and the water involved.

Q. Do you consider that the production of palatable water is one of the obligations and responsibilities of a water treatment plant?

A. I not only consider it an obligation and responsibility, I consider it indirectly a health problem.

MR. EDELMAN: We have no further direct examination, Mr. Chairman.

CHAIRMAN SAMSON: Any cross-examination by either the States of Kansas or Missouri?

Cross-examination by any other political subdivision?

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Ingram, you have referred to--

MR. EDELMAN: Dr. Walton.

MR. BROWN: Dr. Walton.

Q. (By Mr. Schoenlaub.) Dr. Walton. Excuse me. You referred to averages of one sort or another at these plants you visited in comparison with other plants where you have made studies. Could you state briefly the location of some of those other plants which you are using to base these averages on?

A. I think I mentioned that I had opportunity a few years ago to visit most of the water treatment plants in the country that had high coliform densities in their raw water. Those plants ranged from El Paso, Texas, to Lowell, Massachusetts, from Minneapolis, Minnesota, to New Orleans.

Q. Have you visited the plants of the other municipalities on the Missouri River?

A. At the time I made my studies I was into both the Kansas City, Kansas, and Kansas City, Missouri, plant, I was into the Omaha plant, I was into the two at Howard Bend and Chain-of-Rocks plant and St. Louis and the St. Louis County plant.

Q. Have you ever been in the St. Joseph plant?

A. I have never visited the St. Joseph plant.

Q. How long ago was it that you made these studies?

A. The information I collected was during the period, I would say, '54 to '56, all together, from the first to about the last plant I visited.

Q. You wouldn't know, then what type treatment is being used at the St. Joseph water plant?

A. I do not know.

Q. You also in your direct testimony made mention that the water polluted as it is at Atchison brings about the greater possibility of something getting through. Would you clarify that statement?

A. I think in the water works field we are first interested in safety of water from the health standpoint. This means the pathogenic organisms. Your pathogenic organisms, of course, include bacteria, virus, and other organisms such as Entamoeba histolytica. There is no question that if you are treating a water that contains some of this material that the more material it contains the more opportunity there would be that some of it might escape the treatment process.

Q. Are there any records of this ever happening at Atchison, Kansas?

A. Not to my knowledge.

Q. At Leavenworth, Kansas?

A. Not to my knowledge.

Q. At Kansas City, Kansas?

A. Not to my knowledge.

Q. What has been their history of equipment and human failure within their plants at Atchison, Kansas?

A. I was informed that they had such an instance. I think it would be better, I understand that the plant operator will testify, and I think it would be better that he mention it.

Q. He will testify?

A. I believe--is this true?

MR. EDELMAN: We intend to present the operator.

A. I can give you the information that was given to me if you wish.

Q. (By Mr. Schoenlaub.) No, if he is going to testify it would be best coming from him. Are there any records of plant failure at Leavenworth, Kansas?

A. Not to my knowledge.

Q. At Kansas City, Kansas?

A. Not to my knowledge. Now, when I am speaking of plant failure, I am speaking not of the fact that bacteria have gone through the treatment process. I am speaking of the fact that there has been no indication of a health--of an epidemic or any water-borne outbreak of disease due to--

Q. No, I am referring to your statement that--

A. --this.

Q. --all equipment used in these processes has to have operators and you have to allow for equipment and human failure, as to whether or not you have had any reports, you recognizing that as a factor, and if you have any basis to go on so far as Atchison, Leavenworth and Kansas City, Kansas, are concerned.

A. I mentioned there is some basis at Atchison.

Q. But not at Leavenworth or Kansas City?

A. Not to my knowledge at Leavenworth or Kansas City, Kansas.

Q. And you stated that there would be increases in the possibility of an outbreak of water-borne diseases because of this alleged pollution of the Missouri River. Have you any reports from Atchison, Kansas, supporting your statement or your belief that there would be an outbreak of water-borne disease due to this alleged pollution?

MR. EDELMAN: Mr. Chairman, the witness made no statement that there had actually occurred an outbreak of water-borne disease. As I recall his testimony, he said that the polluted condition of the Missouri River represented a hazard and a possibility of the outbreak of a water-borne disease.

MR. SCHOENLAUB: That is basically right.

CHAIRMAN SAMSON: Are you interposing that as an objection?

MR. EDELMAN: I am making that as an objection.

CHAIRMAN SAMSON: It is sustained.

Q. (By Mr. Schoenlaub.) You stated that such pollution increases the possibility of an outbreak of water-borne disease. What is the basis for this conclusion on your part?

A. You are speaking now of the mechanical or human element in this?

Q. No, any concrete evidence you have of this having taken place on the Missouri River and specifically at Atchison, Kansas?

A. The only-- You are speaking now of the pollution in the Missouri River at Atchison, Kansas?

Q. Yes.

A. I have no information of this kind at Atchison, Kansas.

Q. At Leavenworth, Kansas?

A. I have no information of this kind at Leavenworth, Kansas, that is of-- Pardon me. May I come back and have your question again?

MR. SCHOENLAUB: Will you read it?

A. Please, could I strike those answers until I get his question and repeat them?

CHAIRMAN SAMSON: You may. And will you please repeat the question, Miss Reporter?

A. I am not sure I understood you.

CHAIRMAN SAMSON: Now, Dr. Walton, the reporter will read the question back to you.

A. O. K.

(Record read as follows: "QUESTION (By Mr. Schoenlaub.): You stated that such pollution increases the possibility of an outbreak of water-borne disease. What is the basis for this conclusion on your part? ANSWER: You are speaking now of the mechanical or human element in this? QUESTION: No, any concrete evidence you have of this having taken place on the Missouri River and specifically at Atchison, Kansas? ANSWER: The only-- You are speaking now of the pollution in the Missouri River at Atchison, Kansas? QUESTION: Yes. ANSWER: I have no information of this kind at Atchison, Kansas. QUESTION: At Leavenworth, Kansas?")

A. Outbreaks of water-borne disease do not occur, necessarily, at a given point. As an engineer we have got to look at the broader picture of this--

Q. (By Mr. Schoenlaub.) Well, excuse me.

A. All I can say is a pollution level of this kind has, in the past, where a failure of plant operation or human element is involved, caused such outbreak.

Q. Well, Dr. Walton, we are talking--this hearing is concerned with Atchison, Kansas, Leavenworth, Kansas, and Kansas City, Kansas.

A. Yes.

Q. Go ahead.

A. I have no knowledge of water-borne outbreaks having occurred at Atchison, Kansas, at Leavenworth, Kansas, or at Kansas City, Kansas. If that is the answer you wish, that is true.

Q. Now, how would this--to what extent would this possibility of outbreak be decreased with a cessation of discharging our raw sewage into the Missouri River and instead running it through a primary sewage treatment plant?

A. This is a rather difficult question to answer, to be very frank with you. I have never studied the efficiency of sewage treatment plants in removing bacteria and other pathogenic organisms.

MR. SCHOENLAUB: May I ask Government's counsel if you are going to have a witness who is qualified on that?

MR. STEIN: Yes, we will.

Q. (By Mr. Schoenlaub.) You also previously testified that the water plant at Atchison or their operation at Atchison does not assure destruction of all pathogenic organisms. Is that correct?

A. I said within my knowledge. I feel that we have very limited information on certain viruses.

Q. But you have no knowledge as to whether or not such pathogenic organisms would be destroyed in a primary treatment plant, is that correct?

A. A sewage treatment plant?

Q. Yes.

A. I would certainly not expect them to be completely destroyed in a primary sewage treatment plant.

Q. You have also testified that the coliform count at Atchison, Leavenworth and Kansas City indicates substantial sewage pollution. How do you determine or how did you arrive at this conclusion?

A. If you take unpolluted sewage--unpolluted surface waters you will arrive at no such counts.

Q. You referred to "substantial sewage pollution". How do you--

A. Coliform organisms are considered an organism originating from human beings and warm-blooded animals.

Q. There again would a primary sewage treatment plant decrease that count?

A. I have noted that I have never made such a study. I have never studied the removal of bacteria as accomplished by sewage treatment.

Q. In that case you would have no information concerning the effect of such treatment plant on the application of chlorine at these water plants?

A. I have no information that I consider reliable. I have not attempted to find such information, naturally.

Q. You would have no knowledge, then, as to the level of chlorine applied at the St. Joseph plant?

A. No, I have no information on the St. Joseph plant.

Q. So you could not compare the level at St. Joseph with that--

A. No.

Q. --at these other three cities?

A. No, no.

Q. You wouldn't know whether it is higher or lower?

A. I have no information on it.

MR. SCHOENLAUB: I believe that is all.

CHAIRMAN SAMSON: Mr. Brown?

MR. BROWN: Just a few questions, I hope. I assume you hope so too, Doctor.

CROSS-EXAMINATION

BY MR. BROWN:

Q. Would you explain coliform so we can get it definitely in layman's language?

A. I would prefer to have our bacteriologist that will be on the stand explain it. However, I have a copy of Standard Methods of Water and Sewage Examination in my brief case. I will be glad to pull it out and read it to you, if you wish it.

Q. Oh, no, I would rather have it from your own mind. You have been talking about it and you use the term; you are the expert and I am not. I would like to have you tell me what coliform is.

A. Well, very briefly, coliform organisms are those associated with the waste material from human beings and from warm-blooded animals. Without referring to Standard Methods I probably couldn't give you the technical definition. They do ferment lactose broth with gas. I am not sure whether Gram-negative or Gram-positive odds.

Q. You lost me then.

A. And they also in a confirmed test ferment brilliant green lactose broth. As I say, if you want a true definition I would prefer to pick out Standard Methods out of my brief case and read it to you.

Q. Coliform is not a bacteria of any given disease, is it?

A. Coliform are not considered disease-producing bacteria, although there are some species that I believe have been associated with diseases. But as I am speaking of it, I am not considering them disease-producing bacteria.

Q. All right. Then what damage do coliform do to human beings?

A. As used in the water field, coliform are an indicator organism; our Drinking Water Standards are based on the coliform as an indication of the safety of water. In all these waters that I have mentioned coliform have been isolated; at Atchison, at Leavenworth, and at Kansas City coliform organisms have been isolated from the water samples taken from the distribution system. Such isolation is not even considered particularly hazardous if the level is low enough. Our Drinking Water Standards, Public Health Service Drinking Water Standards, permit a certain percentage of the samples examined to have a low level of coliform bacteria. They themselves are not considered hazards.

Q. Is it fair to say that the presence of coliform in water as it gets higher is indicative of the fact that there may be also a higher presence of certain toxic bacteria or deleterious bacteria or disease-bearing?

A. This is the assumption that we make.

Q. That is the assumption you go on?

A. Yes.

Q. It is not the coliform that is dangerous?

A. Correct.

Q. But the fact that it indicates there may be something else there?

A. Right.

Q. And coliform can come both from human beings and, as you pointed out, warm-blooded animals?

A. Correct.

Q. So that could be produced from any kind of pollution that gets in the river from its primary source with warm-blooded animals, including man?

A. Right.

Q. And of course this being a grazing country and a feeder country for cattle, any farm that feeds cattle, there could be coliform get into the tributaries and into the river from that?

A. There could be some coliform come in that way.

Q. Not only can be, but there is?

A. I can not answer. There probably are some, yes, probably are some.

Q. All right. Now, the danger of water-borne disease is a different matter. Isn't it a fact that the danger of water-borne disease is much greater from human sewage than it is from animal sewage?

A. I think most diseases the human has originate from a human source.

Q. All right.

A. Rather than the animal source.

Q. Then city wastage would be more dangerous or more deleterious or perhaps more toxic than waste from a packing district, packinghouse?

A. I believe this is logical.

Q. All right, sir.

A. In most diseases.

Q. So then we get back to my original premise, that the coliform count itself does not necessarily mean increased danger from the coliform organism itself?

A. As far as the coliform are concerned, I do not--I have not spoken of them in terms of a pathogenic organism, merely as an indicator organism.

Q. Did you make any examination of any kind or character at either Atchison, Leavenworth or Kansas City, Kansas, to determine the presence of any dangerous bacteria, that is water bacteria that would produce water-borne disease?

A. I did not.

Q. Do you know of anyone who has?

A. I am not sure that I can answer this question.

Q. Do you know of any water-borne disease in the Missouri River Valley that has been attributed to pollution from the Missouri River?

A. I have not been informed, kept informed of the epidemiological data.

Q. And the Missouri River Valley has been settled, oh, St. Louis, what, 1763, St. Joseph from 1826?

A. If you want to go back, I am not informed of this, but I have heard that there has been some substantial infectious hepatitis. We know that infectious hepatitis can be water-borne. I am not saying that this was. You asked me if I knew of any water-borne disease.

Q. It can come from other sources too?

A. Yes, it can come from other sources too.

Q. And it has never been pinpointed as being water-borne in the Missouri River Valley, has it?

A. As far as I know it has not.

Q. All right, sir.

A. But it is a disease that could be water-borne.

Q. Could be, but I am talking about what is, not what may be.

A. I am not informed of any.

Q. Now, you talked about odors and taste?

A. Yes.

Q. The clearer the water is the deeper the sunlight penetrates and the better change there is for algae growth?

A. Certainly algae growth is stimulated by sunlight.

Q. That is right. And in murky water, polluted water, the sun doesn't get down and in clear water it does, that is true?

A. This is right.

Q. The effect of these impoundments on the upper Missouri, these tremendous impoundments, of course has cleared the water in the Missouri River, hasn't it?

A. It has in certain reaches. I am not familiar enough with the Missouri River to know the complete effect.

Q. Well, you are an engineer. You know what the effect of four large impoundments would be on a situation like that?

A. Except the Missouri River looks awfully dirty to me.

Q. Well, the testimony is it is clearer than it used to be?

A. I have no doubt this is true.

Q. That is more conducive to the development of algae and algae produces odor and taste, doesn't it?

A. Algae is one source of taste and odor problems.

Q. And it is a source that is very vexatious and very difficult to get rid of?

A. Apparently is one of the more difficult--

Q. Yes, sir.

A. --problems to treat.

Q. Also the degree of pollution of a stream depends not only on the waste material that is introduced into it but the flow of the stream, doesn't it?

A. Pardon me. May I have that again?

MR. BROWN: Read it to him.

(Question read.)

A. Yes, there is a dilution factor.

Q. (By Mr. Brown.) Do you know what the difference in the flow of the river at St. Joseph and Atchison is now compared to what it was before Uncle Sam undertook to regulate the river?

A. No, I do not. I am not informed of this.

Q. If the flow is materially reduced at the present time, that allows pollution to occur quicker, doesn't it?

A. It decreases the dilution.

Q. Yes.

A. And would increase the relative pollution.

Q. That is right.

A. Now, I am thinking of concentration rather than total.

Q. But that does increase the necessity for these treatment plants adding--taking additional steps or going higher on their chlorine content?

A. It well could.

Q. Certainly. Now, this question of treating water with chlorine, that is not a very difficult system, is it?

A. No, it is in general use.

Q. Sure. It is one of the standard ways of treating water all over the United States?

A. Certainly.

Q. And is practically foolproof, isn't it?

A. I don't know what I would call practically foolproof. We had a coffee urn downstairs the other day out of order because of mechanical difficulties; this isn't foolproof.

Q. You have heard of dozens of defective coffee urns or coffee percolators where you haven't heard of one defective chlorine treatment, haven't you?

A. I have heard of chlorinators going out of service--

Q. That wasn't my question.

A. --because of a defect in the equipment, apparently, or defective maintenance.

Q. I said you heard of dozens--you picked the example--you heard of dozens of electrical appliances getting out of order, burning out, something happens, whereas you have heard of maybe one chlorine outfit going sour?

A. Well, I have never taken a count of such things; I have never paid much attention. I am sure there are more electrical appliances, there is a greater number of them, go out of service every day than there would be chlorinators maybe in a month.

Q. The cost of the chlorine treatment is not too high, is it?

A. I think chlorine costs probably--it varies different places--range from maybe 6 to 10 cents a pound. It takes about 8 pounds for a part per million gallons, so it is not really--

Q. It is an infinitesimal amount of the treatment. Turbidity in the Missouri River is one thing that has caused a lot of trouble, that is right, you know that?

A. I think that is probably true.

Q. It is far more expensive to get rid of that than it is this coliform count?

A. I have not analyzed the relative cost, but I suspect that the disinfection of water is only a small part of the total treatment.

Q. Yes, sir. And all you have to do as the coliform count goes up is introduce a little more chlorine?

A. I believe you can handle the coliform by adequate chlorination, yes.

Q. Do you know anything about the sewage system at Atchison as to whether or not it discharges into the river?

A. I have made no study of the sewage system at Atchison.

Q. If it does, it would have an effect on Leavenworth, since Leavenworth is downstream?

A. I certainly expect it would.

Q. And if Leavenworth discharges into the river its sewage, it would have an effect on Kansas City, Kansas?

A. I think so, yes.

Q. So whatever the effect that you find at Leavenworth and Kansas City, Kansas, you can't tell this Hearing Board that St. Joseph is the prime cause of that trouble, can you?

A. It is not the only cause of it.

Q. I say you can't even say it is the prime cause, can you?

A. I have made no attempt to analyze this problem.

Q. Do you know what the condition of the water is at the intake of the St. Joseph Water Company, which is above any of these outlets here?

A. I don't know. I have no information on that.

MR. BROWN: I believe that is all. Thank you very much, Doctor.

CHAIRMAN SAMSON: Any further cross-examination by any of the other interested industries?

There being none, how about members of the Board?

DR. MARTIN: Yes, I have a question, please.

CHAIRMAN SAMSON: Dr. Martin, you go ahead.

Q. (By Dr. Martin.) Doctor, you stated your familiarity with the rather complex water work treatment in peace time. Are you also familiar with the more informal method of water purification that might be required for such communities in case of a national disaster or a military disaster such as may be considered by our Civilian Defense agencies?

A. I have some knowledge of some work done at the Robert A. Taft Center.

Q. Are these processes as efficient, more efficient or less efficient than those carried on in the waterwork systems you have been talking about?

A. I can not say that I am in a position to judge their relative efficiency.

Q. The point that I am trying to arrive at, of course, and maybe you could not have an opinion on this, is, in the case of national or a man-made disaster in which a large urban community would have to depend on these informal methods of water purification, whether or not the presence of high coliform contents in the source water would be a major hazard to the public health as compared to a source of water in which the coliform content was substantially lower?

A. Well, certainly I feel that the potential hazard increases with the contamination or pollution and that inasmuch as coliform organisms are an indicator of such pollution I believe that the higher the coliform level the greater the hazard might be.

DR. MARTIN: Thank you. That is all.

CHAIRMAN SAMSON: Any further questions by any other members of the Board?

MR. KURYLO: Mr. Brown very ably asked on cross-examination some of the questions that were arising in my mind about the sewage treatment of the downstream communities. Therefore, I have no questions to ask.

Q. (By Chairman Samson.) Doctor, I have one or two questions and possibly the answers will be found elsewhere, but while we are on the subject: What is a pathogen, in just a short definition?

A. To my knowledge a pathogenic organism is one that causes an infection in man.

Q. And would that include a virus?

A. I would say yes, broadly speaking.

Q. Are you entering into a realm of a lot of probability when you are thinking about what effect chlorination has upon virus?

A. I don't believe that I am, exactly, because I have right here in my notes a paper prepared by Norman Clarke of our Center summarizing all available information on virus. Dr. Clarke has also made some studies himself. And the available information indicates that this infection at levels which will control, certainly, coliform bacteria may not necessarily destroy or inactivate certain viruses.

Q. Well, in other words, then, the normal chlorine treatment of water for human consumption may not control the virus that possibly could be found in that water supply, is that right?

A. I am convinced that some plants operate at levels that it would not.

Q. What is a virus? Possibly somebody else would have that answer.

A. I would prefer that one of our other witnesses for the Government answer this question.

Q. Very well.

A. As I say, the engineers sometimes take these words and use them very liberally without knowing too much how to define them. I think we have a reasonable idea in our mind, but to define it is a little difficult.

CHAIRMAN SAMSON: Very well.

Now, any further redirect?

MR. EDELMAN: Yes, Mr. Chairman.

## REDIRECT EXAMINATION

BY MR. EDELMAN:

Q. Dr. Walton, if a sewage treatment plant were put in operation in the St. Joseph area which treated the waste which is now discharged into the river and if such treatment provided a substantial reduction in the coliform pollution of the river and a substantial reduction of the nutrient material introduced into the river, would that, in your opinion, reduce the level of pollution at Atchison, Leavenworth, and Kansas City, Kansas?

A. Yes.

Q. Can you tell us, Dr. Walton, how often the Atchison water plant samples the water at its intake to determine the coliform loading?

A. To my knowledge, the Atchison water plant does not sample raw water at their intake to determine coliform loading, unless it is for a very special reason.

Q. Where do they sample it?

A. The Atchison water treatment plant, to my knowledge, runs no-- Now, pardon me. Maybe I had better retract a little bit. Atchison water treatment plant makes no bacteriological analysis on their own. They do send samples to the state laboratory. I have seen data on treated water samples and distribution water samples that were sent to the state laboratory and results of such.

Q. Do you--

A. I don't remember seeing any such information on raw water samples.

Q. As a matter of fact, the Atchison plant does not, as far as you know, take any raw water samples?

A. I think the only ones taken were involved in special studies of the Public Health Service.

Q. Do you know how long it takes the Atchison plant to get a bacteriological report from whoever does their analysis?

A. From my information I would assume a sample is taken on one day, has to be transported to the state laboratory, the results would not be available for at least 48 hours after the laboratory had received them. It would take 72 hours, approximately, as a minimum for Atchison to be informed of the results of that sample. In some cases I think there was another 24 hours delay in starting the examination of the sample.

Q. In other words, in a plant as small as the Atchison Plant, the application of the level of chlorine application is primarily geared to have a residual chlorine in the finished water, is it not?

A. Yes.

Q. And the level of coliform is an unknown factor to this plant, is it not, at the time the water goes through treatment?

A. Yes.

Q. And it is possible, is it not, that with a substantial increase in the coliform count in the raw water which was unexpected by the plant that more chlorine than was being applied at that time might be required to produce a safe water?

A. Certainly if the chlorine demand increases more chlorine would have to be applied.

Q. Doctor, is typhoid a water-borne disease?

A. Typhoid is one of the diseases that are water-borne.

Q. Are you aware of a wide-spread epidemic in the Missouri Valley of typhoid about 1912?

A. I can't say that I am. There was, however, a water-borne outbreak at Chamberlain, South Dakota, in the 30's.

Q. Of typhoid?

A. Of typhoid.

Q. Is that on the Missouri River?

A. That is on the Missouri River. I believe it was the result of failure of chlorine equipment, or inoperation, I don't know which.

MR. EDELMAN: That is all.

CHAIRMAN SAMSON: Any further recross by industry?

MR. BROWN: I have none.

CHAIRMAN SAMSON: The City of St. Joseph?

MR. SCHOENLAUB: No questions.

CHAIRMAN SAMSON: Any questions by the Board?

MR. POOLE: Yes, sir.

Q. (By Mr. Poole.) You testified earlier that Atchison had an average coliform density of 50,000 per 100 ml. My question is, what is the source of that information? Was that part of your special studies?

A. That information was supplied to me by Mr. Kittrell of the Public Health Service, who will be on the stand later.

MR. POOLE: Thank you.

CHAIRMAN SAMSON: You may be excused.

(Witness excused.)

CHAIRMAN SAMSON: We have five more minutes here, gentlemen, that we can avail ourselves of. Does the Government have another witness that they can start with?

MR. EDELMAN: We can start another witness, Mr. Chairman, and break off whenever you indicate.

CHAIRMAN SAMSON: Why don't you put him on and just get started, then?

MR. EDELMAN: Mr. Kittrell.

Mr. Chairman, might I suggest that perhaps it might be helpful to the witness if we reconvened five minutes earlier. It would save the interruption of his testimony.

CHAIRMAN SAMSON: That will be agreeable, to start about 5 minutes of 2. Now, there are some gentlemen back in the hall that had a problem.

Will that work out all right, to be back here at 5 minutes of 2?

Very well, we will then adjourn until 5 minutes of 2.

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WHEREUPON, the hearing stood at noon recess until the hour of 1:55 o'clock in the afternoon, at which time the following further proceedings were had and entered of record, to wit:

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## AFTERNOON SESSION, TUESDAY, JULY 28, 1959

CHAIRMAN SAMSON: The hearing Board will now convene.

Does the Government have some witnesses who have not been sworn that are to be sworn before they testify?

MR. STEIN: Yes, we do.

CHAIRMAN SAMSON: Will you kindly have them step forward.

MR. STEIN: Mr. Griffith and Mr. Wheeler.

(Witnesses sworn.)

MR. STEIN: Mr. Griffith.

C. R. GRIFFITH,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

### DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Will you give your name and address to the reporter, Mr. Griffith?

A. C. R. Griffith, 1407 Ruby, Kansas City, Kansas.

Q. By whom are you employed, Mr. Griffith?

A. Corps of Engineers.

Q. What are your duties with the Corps?

A. I am channel inspector.

Q. How long have you been employed by the Corps of Engineers?

A. A little over 30 years.

Q. What area of the river do you inspect?

A. About 80 percent of the time it is from Kansas City to Waverly and 20 percent of the time from Rulo, Nebraska, to Kansas City.

Q. Where is Waverly with respect to St. Joseph?

A. Downstream.

Q. Downstream from St. Joseph?

A. About a hundred and--

Q. Mr. Griffith, would you try to speak towards the Board?

A. Oh, yes, sir.

Q. How do you conduct your inspection? Do you use a boat?

A. We use a boat, make an average of two to three trips a week over the river.

Q. Have you had occasions in your inspections to go past the water front at St. Joseph, Missouri?

A. Yes, sir.

Q. When did you most recently go by that water front?

A. About a month, maybe five weeks, ago.

Q. Can you tell us what you have observed along the water front at St. Joseph?

A. There is an awful lot of sewers.

Q. Have you seen sewage material in the water?

A. Yes, sir.

Q. Can you describe it?

A. It is pretty hard to describe. I have seen feathers and straw and human waste, a lot of other--a lot of stuff I don't know what it is. I have seen it looked like bloody meat floating, just an awful lot of stuff.

Q. Have you ever seen wing nets which have been placed in the river below St. Joseph?

A. Yes, I saw one the last time I was up here.

Q. Where did you see that net?

A. Oh, it was down there somewhere below the Dannen Mills. I never paid any particular attention, just below the Dannen Mills, I would say, a little ways.

Q. Can you describe the condition of that net? Did you see it when it was out of the water?

A. Yes, the man was raising it. We held up the boat so we wouldn't rock him while he was raising it. Oh, it had an awful lot of trash.

Q. What kind of trash?

A. Well--

Q. Did it nave what is euphemistically called rubber goods on it?

A. Plenty of it.

Q. About how many, would you estimate? Was it a large number?

A. This was a wing net. Yes, it was a large number. I would say somewhere between maybe 100 or more, maybe 200. I dare say there was one in almost every mesh and some of them more than that.

Q. Do you know how they can get that kind of trash off the nets?

A. Pretty near have to pick it off. You can't shake it off.

Q. In the operation of your boat do you have a crew on it?

A. Yes, sir.

Q. Can you tell us whether these men have been immunized against any kind of disease?

A. Typhoid fever, yes, sir.

Q. Do you know who paid for those shots?

A. The Corps of Engineers--

MR. BROWN: Well, I don't think that has anything to do with it, who pays for the shots. What difference does it make?

MR. EDELMAN: It indicates a recognition by the Corps of Engineers, Mr. Brown, that these men are exposed to a hazard in the course of their employment and that these shots are part of the expense of their employment.

MR. BROWN: Every man in the Army is inoculated against typhoid. Let's prove that everybody who is exposed to anything is inoculated against typhoid. I don't think that has anything to do with it.

CHAIRMAN SAMSON: Overruled.

Q. (By Mr. Edelman.) You were inoculated against typhoid?

A. Yes, sir.

Q. Can you tell us why you obtained an inoculation?

A. Well, one of the Government doctors told us one time, that has been many years ago, that we should have it every three years and I believed him and I take it every three years.

Q. Do the men on your boat in their work come in contact with the water of the Missouri River.

A. Oh, yes.

Q. Can you tell us what they do that brings them into contact with it?

A. Well, on my particular boat the worst hazard is sounding with the pole.

Q. How do they take those soundings?

A. Well, they have a 16 to 18 foot pole. It depends on the boat. My particular poles are 16 feet. They drop them in the water and turn them over and turn it again, it is marked 8 feet on each end. And that water splashes all over them, of course, as they raise and lower it or as they turn the pole.

Q. The water gets on their hands?

A. Oh, yes, all over them.

Q. Their clothes get saturated with it?

A. All down the front of them.

Q. Has anything besides water ever collected on these poles while the men were taking soundings?

A. Oh, yes, you get some kind of grease. Sometimes it gets slick, they lose the pole and have to retrieve it. Sometimes it gets awful hard to hold.

Q. What area of the river is this you are describing now?

A. Well, usually around any city, around close to any city that happens.

Q. In other words, these conditions obtain when you take soundings below St. Joseph?

A. Yes, sure.

Q. Have you in your inspection of the channel in the area described ever seen collections of driftwood at dikes in the river?

A. Every dike has a collection of driftwood, yes, sir.

Q. Does this driftwood represent any particular kind of hazard?

A. Well, it if gets saturated with this grease they burn oftentimes. Well, I wouldn't say oftentimes, but they do burn, yes; I have seen several.

Q. You have seen dikes burning because of the--

A. I seen one I think it was last fall down just below St. Joe on the right bank, down below Peters Creek.

Q. Who is responsible for replacing these dikes?

A. The Corps of Engineers.

Q. They pay for it?

A. Yes, sir.

Q. Now, the cabin cruiser that you use in your inspection, does this have a toilet, Mr. Griffith?

A. Not any more.

Q. Well not any more?

A. Why, we had so much straw and feathers and other things in it, it was just almost impossible to keep it in working condition. You always had to back flush the thing and take it apart and clean it out, and it was just more trouble than it was worth.

Q. Where do these straw and feathers collect with respect to your operations around the City of St. Joseph, above or below?

A. Well, they are always below, of course.

Q. Always below St. Joseph?

A. Yes.

Q. Have you had any other trouble in the operation of your boat in the St. Joseph area?

A. Oh, we collect some kind of a slime or a grease on the hull if you lay around here very much and it is difficult to remove. The only way you can get it off is to take it on a sandbar and scrub it with sand or detergent or both.

Q. Does your boat use river water for cooling?

A. For cooling, yes--I mean for a heat exchange, yes.

Q. Heat exchange?

A. Yes.

Q. Do you have any problems with the intakes on boats that use river water for cooling in this area?

A. Oh, yes.

Q. What are those problems?

A. Oh, we get trash in them. Oh, we have to take them apart and back flush them to get it out and sometimes the pump itself is stuck with, oh, straw or feathers. Feathers give us an awful lot of trouble.

Q. You have been on this river about 31 years, Mr. Griffith, haven't you?

A. Very close, yes, sir; all my life, I mean paid for 31 years.

Q. Have you observed any increase in the use of the river for recreational purposes in the last few years?

A. Very much, yes, sir.

Q. What kind of recreation goes on along the river below St. Joseph?

A. Oh, they swim and they water ski and they, oh, boat, fish, hunt.

Q. Have you ever fished in the stretch of the river below St. Joseph?

A. No, sir.

Q. Why not?

A. I just wouldn't--I wouldn't eat the fish myself and I wouldn't expect anybody else to.

Q. Why?

A. Well, I just don't believe they are clean.

Q. Have you in your inspections of the channel ever observed stock watering in the Missouri River below St. Joseph?

A. Yes, sir.

Q. Can you tell us when you saw them?

A. Oh, I couldn't give you no date.

Q. Approximately?

A. Every trip we see stock drinking out of it. I don't think there would be any exceptions. Every trip you see stock drinking out of the water.

Q. Can you identify the area that you see stock drinking? I mean is it any specific place along the river or is it all along the river?

A. All along, both sides.

Q. Wherever the stock can get to the river?

A. Yes, wherever they have stock. Of course they usually don't--where the banks are real high or something like that they don't usually, but wherever stock can get to the water, if it is a good bar or something, they usually drink out of it.

Q. Do you consider that the conditions of sewage pollution that you have described make the work that you do and the work that the men on your boat do more difficult?

A. I don't know about more difficult, but it is more disagreeable for sure.

Q. You indicated you observed swimming in the Missouri River?

A. Yes.

Q. Can you tell us about how many people you saw from time to time and when? Have you seen any this summer?

A. Oh, yes, every trip.

Q. Where do they swim, from a bank, from a sand bar?

A. Well, either one, it don't make any difference. Especially on Saturday and Sunday, they just--well, it is quite hazardous for us. I mean we have to keep--it makes us go slow past places to keep from drowning them or washing them away, often.

Q. Could you keep your voice up, Mr. Griffith.

A. Often, yes.

Q. Can you give us any estimate of the numbers of people you see on a weekend, for example?

A. You mean in an entire trip for me, maybe?

Q. Well, the area from below St. Joseph downstream. Would you say it was a large number?

A. Oh, I would call it a large number; probably maybe in an entire trip we see 50 on a Saturday and Sunday, I would say that many. Water skiers, you see a lot of those, too.

MR. EDELMAN: No further questions, Mr. Chairman.

CHAIRMAN SAMSON: Cross-examination by any representatives from either Kansas or Missouri?

The City of St. Joseph?

MR. SCHOENLAUB: Yes.

CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Griffith, how many dikes have you seen burn because of grease on debris?

A. You mean in my time on the river?

Q. Well, say within the past year?

A. Two.

Q. For how long have you been having trouble with your boat due to the collection of slime and grease on the hull?

A. Oh, several years, several years. Almost--that is one of the reasons we did away with the wooden hull boats, you couldn't clean them. We have got steel-hulled boats.

Q. How long ago did you do away with wooden-hulled boats?

A. It must have been about seven or eight years.

Q. And that is when you first started noticing the collections of slime and grease?

A. Oh, no, it was before that, because that is why we did away with the wooden-hull boats.

Q. How long before that?

A. I can't say, but it was ever since I have been on the river.

Q. Thirty years you have been on the river?

A. Probably.

Q. Where else have you had trouble other than south of the City of St. Joseph?

A. Kansas City.

Q. Have you had trouble north of St. Joseph?

A. No.

Q. Would you describe the type of trash that you get in the intakes of your boat?

A. Well, the thing that gives us the most trouble, and especially in the fall of the year, is chicken or turkey feathers, and then straw, of course, gives us a lot of trouble.

Q. Do you know where those turkey feathers would be coming from?

A. I don't have the slightest idea other than out of sewers, so far as I know, but I don't know.

Q. Do you know of any turkey farms around St. Joseph?

A. Certainly don't.

Q. Or any turkey plants in St. Joseph?

A. No.

Q. But you get turkey feathers out of our sewers?

A. Well, they are some kind of feathers.

Q. Well, what kind of feathers? You described them as turkey.

A. I said chicken or turkey.

Q. Do you swim in the Missouri River?

A. No, sir.

Q. At any place on the Missouri River?

A. Never.

Q. Why?

A. I just don't think it is the thing to do.

Q. Why?

A. Well, besides being filthy, it is rather dangerous.

Q. In what way is it dangerous, Mr. Griffith?

A. Well, it would be dangerous--in my opinion it would be dangerous to my health, and then the currents are not good--conducive to good swimming.

Q. Are the currents safe?

A. I don't think you would be any cleaner when you got out.

Q. Would you advise anyone to swim in the Missouri River?

A. No, sir. I would advise against it if anybody should ask me.

Q. Even though there is a sewage treatment plant at St. Joseph would you advise--

A. I would still say no.

Q. You don't think it is suitable for swimming?

A. Not in my--

Q. Under any condition?

A. Not in my opinion, no.

Q. And, again, because of the type river that the Missouri is, is that not correct?

A. That is partly it, yes, sir.

Q. That it is a dangerous river?

A. It is dangerous and then it is filthy too.

Q. Even taking all of the filth out, it still would be dangerous to life if you tried to swim in it too much?

A. It would be dangerous on the bank side, dangerous to life, yes, on the bank side, not on the bar side.

Q. That is where there is no current?

A. That is right.

Q. Does the Missouri have a rather strong current or would you say that it is a gently-flowing river?

A. It is a rather strong current.

Q. Do you ever see any type of debris other than what you would think comes from sewers in the Missouri River?

A. Oh, yes.

Q. Is there a considerable amount of debris in the river?

A. Yes.

Q. Submerged logs and that type?

A. Often.

Q. Would you state to the Board some of the locations on the Missouri where you have seen stock being watered?

A. Well, I think the last trip that I was up here I saw two or three cattle, I won't say the number, but it was more than one, two or three.

Q. Two or three?

A. Probably.

Q. Cows or something?

A. Yes. Just below the mouth of Peters Creek on the right bank.

Q. Where is Peters Creek?

A. That is the creek that runs through Wathena and empties into the Missouri River opposite and a little below the upper end of Contrary Lake.

MR. STEIN: Point of clarification. What state is Wathena in?

A. Kansas.

MR. STEIN: Thank you.

A. And on the left bank about opposite where the town of--it is not a town any more--Kenmore would be, on the left bank, there is a lot of cattle in there that drink out of the river.

MR. BROWN: Point of clarification, the left bank is in Missouri, isn't it?

A. The left bank is in Missouri, yes, sir.

Q. (By Mr. Schoenlaub.) What have you seen on the right bank?

A. That was at the mouth of Peters Creek on the right bank.

Q. On the right bank?

A. Yes, sir. There is a bunch of cattle down opposite at the head of the bluff just below Wathena there, the head of the rock bluff, that is, there is a bunch of cattle in there that drinks out of the river too.

Q. What is the predominant type of agricultural activity along the Missouri River?

MR. EDELMAN: If you know, Mr. Witness.

Q. (By Mr. Schoenlaub.) If you know.

MR. SCHOENLAUB: Well, he is on it every day.

A. Well, I have seen them raise a lot of corn. I don't know what you are trying to--

Q. (By Mr. Schoenlaub.) Would you say that corn and wheat were the predominant types of activity?

A. You mean for agriculture?

Q. Yes.

A. For agriculture I would say corn and wheat and soybeans.

Q. Mainly a farming rather than a stock-producing region?

MR EDELMAN: Mr. Chairman, I object to that question. It calls for a conclusion on the part of the witness that he hasn't indicated he is qualified to give. He has been up and down the river.

MR. SCHOENLAUB: He sees the banks of the river and the activity along the river every day.

MR. EDELMAN: Mr. Schoenlaub, how in the world can he testify as to what is the predominant form of industry around here?

CHAIRMAN SAMSON: Would you read the question back, Miss Reporter?

MR. EDELMAN: If he can, I have no objection to his answering the question.

CHAIRMAN SAMSON: Well, permit the Chair to rule, then, that if the witness can and does know that he should answer.

A. Well, I still say corn and wheat and soybeans and cattle and hogs.

Q. (By Mr. Schoenlaub.) What do you see the most of?

A. The most of is willows, but--

Q. In other words, there is very little agricultural use of the area immediately adjacent to the Missouri River?

A. No, not very little.

Q. Well, most of it is willows?

A. Forty percent, probably.

Q. Most of it is wilderness?

A. Most of it is willows. On the bar side is always willows. On the channel side is usually agriculture of some sort, not 100 percent, no; 60 percent, probably.

Q. Is there much agricultural use of the area immediately adjacent to the river or is it mostly willows?

A. Well, again I would have to say on the bar side it is mostly willows. On the channel side you get about, oh, 50 percent agriculture, I guess.

Q. What type of agriculture for the most part?

A. Corn and wheat, mostly corn, but there is some wheat and some soybeans.

Q. Then you say that about 50 percent of the channel side is agriculture?

A. Yes. The rest of it is usually--

Q. About what percent of that would you say is corn and wheat and soybeans?

A. I would say all of that 50 percent would be corn, wheat and soybeans. I don't know, there may be other--

Q. So that there would be very little actual stock raising?

A. Well, the stock raising is usually in the willows and the timber along the river. When you get away from the river that doesn't hold true, but along the river the stock is usually raised in the timber and in the willows and rougher places like the bluff below Wathena over there where it is mostly timber, but it wouldn't be suited for agriculture, it is a little too steep. They graze cattle in there.

Q. I don't know whether you answered this or not, but does the hull of your boat collect slime and grease any place other than downstream from cities?

A. No.

MR. SCHOENLAUB: I believe that is all.

CHAIRMAN SAMSON: Mr. Brown, do you have some cross-examination?

MR. BROWN: Yes, please.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Griffith, you said you operated from Rulo southeast as far as Waverly?

A. Yes, sir.

Q. Rulo is up here in Nebraska?

A. Yes, sir.

Q. And, let's see, Waverly is east of Jefferson City, isn't it?

A. No, Waverly is 80 miles--

Q. Oh, I know where Waverly is.

A. Eighty miles by water--

Q. I know where Waverly is. Eighty percent of your travel is between Kansas City and Waverly and twenty percent--

A. That is right.

Q. --between Kansas City and Rulo?

A. Yes, sir.

Q. And you have been on the river a long, long time?

A. Pretty long.

Q. And I expect you have seen it in high water and low water?

A. Yes.

Q. Seen it in flood and when it was not in flood?

A. Yes, sir.

Q. You know then, don't you, that a great many times the river is literally choked with debris that has been washed down from the countryside in times of high water?

A. Right.

Q. And it is full of dead animals?

A. That is right.

Q. And occasionally, unfortunately, human bodies?

A. Yes, sir.

Q. You know that every time there is a heavy rain it clears the countryside just as it does the cities, doesn't it?

A. Right.

Q. And that all washes into the Missouri River?

A. It does.

Q. And that all constitutes defilement or pollution in the broad sense of the Missouri River, doesn't it?

A. I don't know the meaning of pollution.

Q. Well, it dirties it up, let's put it that way?

A. That is right. All right.

Q. And it comes in from a great many sources other than cities and municipalities?

A. Everywhere it rains, yes, sir.

Q. Incidentally, Mr. Griffith, this business on your pilings burning, those pilings are creosoted?

A. No, sir.

Q. Are they treated at all?

A. No, sir.

Q. Not treated in any way?

A. No way.

Q. A good many of these fellows that live along the river make a pretty good living by picking out floating pilings and sawing them up and selling them for firewood, don't they?

A. I don't know about firewood. They saw them up and make lumber, yes.

Q. And they don't have any trouble with the grease on them, do they?

A. I don't know about the trouble. They have got the grease.

Q. You have seen two pilings burn?

A. I have seen two dikes burning.

Q. Two dikes burning?

A. Yes.

Q. Do you know what started them?

A. I mean in the last year now.

Q. I am talking about the last year.

A. All right.

Q. Do you know what started them?

A. I have no idea.

Q. Of your own knowledge do you actually know that grease caused those pilings to burn?

A. No, sir.

Q. All you know is there were some wooden pilings which were burning?

A. And the brush on the drift above them, yes, sir.

Q. Surely. And wood burns, doesn't it?

A. Yes, sir.

Q. Mr. Griffith, this business of inoculation for typhoid.

A. Yes.

Q. Would you say that 80 percent of your inoculation is to prevent typhoid east of Kansas City?

A. Yes, that is where I do 80 percent of my work.

MR. BROWN: That is all. Thank you very much.

CHAIRMAN SAMSON: Any further cross-examination by any of the interested parties?

Any questions by any members of the Board?

I just have one or two questions I wanted to clear up here, Mr. Griffith.

Q. (By Chairman Samson.) You were speaking about the two banks of the river that you saw animals or cattle coming down to drink from both banks of the river. Just for the purpose of the record would you relate where those banks are located, in what states?

A. Well, it would be both Kansas and Missouri, that is along this area down through here it would be Kansas and Missouri.

Q. That is one bank would be on the Kansas--

A. The right bank is on the Kansas side and the left bank is on the Missouri side.

CHAIRMAN SAMSON: That is all. Thank you.

You may be excused, if there are no further questions.

MR. SCHOENLAUB: I have a question.

CHAIRMAN SAMSON: Mr. Schoenlaub has another question.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Again how many cattle did you say you saw grazing the last time up on the right bank?

A. If you are talking about that place below Peters Creek it was either two or three. There was more than one.

Q. And at what time-- When is the river the dirtiest, Mr. Griffith, during a period like exists right now or during a period of high water when there is flooding?

A. Well, during a period of high water, after a heavy rain, of course, it is dirty, more mud and silt and debris.

Q. And is it dirty above the City of St. Joseph?

A. Oh, it certainly does, yes.

Q. Any worse than it is below the city?

A. Not a bit.

Q. Is it any worse below the city than it is above?

A. You are talking about debris that the rains and the creeks put in?

Q. Yes.

A. No, no difference.

MR. SCHOENLAUB: I believe that is all.

CHAIRMAN SAMSON: If there are no further questions, this witness may be excused.

(Witness excused.)

MR. EDELMAN: Mr. Wheeler.

ORA J. WHEELER,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Will you give your name and address, Mr. Wheeler?

A. Ora J. Wheeler.

MR. BROWN: What is that first name, please?

A. Ora, O-r-a. 1909 East Fortieth Street, Kansas City, Missouri.

Q. (By Mr. Edelman.) I remind you, Mr. Wheeler, that you were sworn earlier and the testimony you are about to give is subject to that oath.

A. Yes, sir.

Q. By whom are you employed?

A. The Corps of Engineers.

Q. In what capacity?

A. As a channel inspector.

Q. What are your duties as channel inspector?

A. To make trips up and down the river to report the condition, depth, and the direction of the channel, and to inspect the banks and the dikes and any failure in the construction that we might find during the course of the reconnaissance trip.

Q. How long have you been employed in that capacity?

A. It will be 30 years this coming February.

Q. What area of the river do you operate in?

A. I operate between Rulo, Nebraska, and Kansas City.

Q. How often do you make a trip between Rulo, Nebraska, and Kansas City?

A. I make one round trip each week.

Q. What kind of a boat do you use?

A. It is a 43-foot cabin cruiser.

Q. You indicated in your testimony that you reported about the condition of the channel. How do you determine that?

A. By taking soundings.

Q. How do you take soundings?

A. Well, as long as the river is in fair condition, that is if we have a depth of 7 feet or more, we use a depth finder. It is an electronic gadget that measures the depth of the water. And when we encounter 7 feet or less, we think it should be investigated further and more positive, we use a pole.

Q. Are these the sounding poles that Mr. Griffith described earlier?

A. Yes, sir, they are the same poles.

Q. Does your mechanical sounder always work?

A. No. It is like anything mechanical, it has its weak points.

Q. By weak points you mean sometimes it does not work?

A. Sometimes it doesn't operate. It blows a tube or a fuse. It is an electronic affair and they are not always perfect.

Q. Can you tell us where the channel in the St. Joseph, Missouri, bend is located with respect to the City of St. Joseph, Missouri?

A. Well--

Q. Is it closer to the city side than the opposite side of the river?

A. The channel runs past the City of St. Joseph on the St. Joseph side of the river, yes.

Q. As you go up and down the river do you notice the condition that exists at the St. Joseph water front?

A. Yes. It is, to begin with, very smelly, and there is debris and sewage that comes into the river from the sewers of St. Joe.

Q. Is this smell objectionable or pleasant?

A. It is not too pleasant.

Q. Does your crew ever have any reaction to it?

A. Well, I have one man, the deckhand on the boat, if it is necessary to use a pole in the vicinity of I believe you call it the south St. Joe sewer or the farthest one down the river here, why, he usually always loses his meal right then and there.

Q. Have you had any difficulty in the operation of your boat in the St. Joseph area?

A. Well, we have had some trouble with our raw water, that is our cooling raw water. It picks up what appears to be small pieces of fat and meat and entrails and feathers and that sort of thing and it clogs up the intakes and it is necessary at times to hook up the city line there at St. Joe and back flush them.

Q. Do you have a toilet on your boat?

A. Yes, sir.

Q. How does that operate?

A. Well, it takes--

Q. Does it operate successfully or do you have difficulty with it?

A. It takes water from the river and we have quite a lot of trouble at times to keep it open. I would be like Mr. Griffith, if it wasn't for the fact that occasionally we have ladies on the boat and it is almost a must to keep one on there, otherwise we would probably do away with it.

Q. What toilet facilities do the men on your boat use?

A. Well, they use this toilet, but it is a chore to keep it open.

Q. Have you observed any difficulty in keeping your boat clean when it operates in the vicinity of St. Joseph?

A. If we spend very much time here, the boat is tied up, we collect a scum right at the water line and it is very difficult sometimes to get it off and we have difficulty making paint stick at that particular point because it is a greasy film of some sort.

Q. Is this a steel-hulled boat?

A. Yes, sir.

Q. Going up and down the river you have observed other uses of the river, have you not?

A. Yes, sir.

Q. Can you tell us whether the use of the river for recreational purposes, such as boating, swimming, and water skiing, has increased in recent years?

A. I would say 300 percent in the past 2 years.

Q. In all those activities?

A. Yes, sir.

Q. More people swim in the river now than used to?

A. More people. A week ago Sunday I observed in the neighborhood of 50 to 75 people swimming on a bar above Leavenworth, Kansas, about 4 miles above Leavenworth.

Q. Have you ever seen in your trips stock drinking from the Missouri River?

A. Yes, sir.

Q. Can you tell us in what portion of the river you observed this?

A. There is a location directly across from Dannen Mills, across and downstream from Dannen Mills, where stock graze and drink constantly. A location below Peters Creek. There is a location at Palermo, which is mile, well, 452 in reference to St. Joe. St. Joe is mile 460. And on the Missouri side just above the Contrary drain, the Lake Contrary drain.

Q. Do you have any estimate of the number of stock involved with reference to those located on the Kansas side of the river?

A. Well, it seems like at times there is more than others and I would say that 15 to 20 head would be in that particular locality. However, in the fall of the year you can find stock in most any place where they have had a corn field. Most any place there has been a corn field and the corn is picked by these mechanical pickers you will find that people turn the stock in to use up that corn that is on the ground and that would be in any area up and down the river.

Q. Do you ever fish in the Missouri River below St. Joseph?

A. No, sir. No, sir.

Q. Why not?

A. Well, in the first place, I don't like to fish, and in the second place I wouldn't know what to do with them if I caught them.

Q. Do you like to eat fish?

A. No, sir.

Q. Do you know anybody who does?

A. Well, there is a lot of people that eat fish out of here, but they don't see as much of the river as I do. They don't see where they are caught.

MR. EDELMAN: No further questions, Mr. Chairman.

CHAIRMAN SAMSON: You may cross-examine.

MR. SCHOENLAUB: I have no questions.

CHAIRMAN SAMSON: Mr. Brown?

CROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Wheeler, something was said about there being a head on your boat?

A. Yes, sir.

Q. That empties right into the Missouri River, doesn't it?

A. It certainly does.

Q. Now, have you ever had any trouble with feathers, chicken feathers?

A. Well, there are some kind of fowl feathers. I wouldn't know a chicken from a turkey or a duck, but they are feathers and I will tell you when you get most of them is around Thanksgiving time.

Q. Did you know that there have been no killings and no feathers dumped from the industrial district of St. Joseph since 1957?

A. No, sir, I did not. That don't keep--

Q. You don't undertake to tell this Board that you see chicken feathers coming in from either of those two sewers--

A. I didn't say where they come from. There are a lot of chickens picked in the homes and go down the sewer too.

Q. Do you find feathers below Atchison and Leavenworth?

A. Yes, sir.

Q. Below Kansas City?

A. Yes, sir.

Q. You heard my questions to Mr. Griffith. You have been on the river a long time also, I assume?

A. Yes, sir.

Q. And you know that it is a fact that particularly in times of high water the river is literally clogged--

A. Yes, sir.

Q.--with debris of all types?

A. Yes, sir.

Q. You find a lot of dead animal carcasses and when the water goes down you find a lot more?

A. That is right.

Q. And all of this stuff that is washed off the farms where the tributaries come in, that is all washed into the Missouri River, isn't it?

A. Yes, sir.

Q. In other words, the river is contaminated from thousands and thousands of sources, that is true, isn't it?

A. Yes; I would call that an act of God, though.

Q. Well, I would agree with you on that. But that doesn't mean it isn't contaminated?

A. It certainly is.

MR. BROWN: I believe that is all. Thank you very much.

CHAIRMAN SAMSON: Questions by the Board?

And I have none.

MR. KURYLO: I have one.

CHAIRMAN SAMSON: Excuse me, Mr. Kurylo. Go ahead.

Q. (By Mr. Kurylo.) How often do you have high water?

A. That depends on the weatherman. That is something that we can't-- I couldn't answer that because we usually can count on about two a year, two fairly high waters, but it just depends on how much it rains.

Q. And what is the duration of each period of high water, a day, a week, a month?

A. Well, no, not a month, not a week. Usually a couple of days. This river rises fast and runs out fast any more.

MR. KURYLO: No further questions.

Q. (By Chairman Samson.) I wondered in connection with any of these sewer outlets along the river whether you notice any rats along those?

A. Yes, sir, yes, sir. The banks--I could take--sit down here along the St. Joe Government Yard there of an evening with a rifle and probably kill a couple hundred.

Q. Do you know whether they feed on anything down in there?

A. I would imagine that is what they are--they are right at the water's edge; that is where they do their feeding.

Q. I mean is there something in the water that they feed on?

A. Well, I would say it was this scum that is left right at the water's edge.

Q. Where is-- Is that near your boat landing?

A. Yes, sir, right there at the boat landing, right there at the boat landing.

Q. Could you show on Government Exhibit 13, which is right behind you there, approximately where that is located?

A. Yes, sir. It is this right here (indicating).

MR. STEIN: Will you indicate the number to which you are pointing?

MR. EDELMAN: That tab has a number on it, Mr. Griffith.

A. That is M-12.

Q. (By Chairman Samson.) Mr. Wheeler, have you noticed them at any other point along the river?

A. Oh, yes, sir, they are any place in this area, any place along the water front.

Q. How about the size of the rats?

A. They are pretty good-sized rats.

Q. That is a relative term.

A. Well, I would say 4 to 8 inches long. They will vary from 4 to 8 inches long.

CHAIRMAN SAMSON: I have no further questions.

MR. EDELMAN: We have one more question, Mr. Chairman.

## REDIRECT EXAMINATION

BY MR. EDELMAN:

Q. You indicated that your boat docked near M-13. Is that the Duncan Street Sewer?

A. I believe that is what it is labeled, the Duncan Street Sewer, yes.

Q. M-13?

A. This one right here (indicating).

Q. M-12, Duncan Street outfall?

A. That is right.

Q. Have you while you are docked there ever noticed any material coming out of that sewer that had a perceptible odor?

A. Usually every night. It doesn't occur until after dark. At night there is something that comes out of that sewer that has a very--well, I will put it this way, it smells like gasoline. It is gasoline or a solvent of some kind and it runs at night and in the daytime it quits. There is a little evidence of it during the day, but most at night and it is a very strong odor.

Q. Does that float on top of the water?

A. Floats on top of the water, yes.

Q. Do you take any precautions on your boat because of that material?

A. Well, I have warned the boys not to throw any cigarettes in the water there because it might be inflammable.

MR. EDELMAN: That is all.

CHAIRMAN SAMSON: I have just one more question, Mr. Wheeler.

Q. (By Chairman Samson.) How far downstream from St. Joe do you notice this condition that you have testified to?

A. Which condition is this?

Q. Well, of the matters that you see in the river?

A. Are you speaking of the rats or speaking of what comes out of that particular sewer?

Q. Of the rats and what comes out of the sewers.

A. Well, the rats, I would say, would be all the way down below Dannen Mills, down in the Lake Contrary country, that far down. And this particular fluid that comes out of that sewer, it is noticeable right there. Now, I haven't paid too much attention to it below there, but we are tied there and there at night and that is when the odor is terrific and it smells very much like gasoline.

CHAIRMAN SAMSON: That is all.

MR. SCHOENLAUB: I have one more question.

CHAIRMAN SAMSON: All right.

## RECROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. You had trouble with this debris and grease collecting on your hull, and so forth, above Kansas City?

A. Oh, yes.

Q. For how far down the river from St. Joseph do you notice it?

A. Well, you will notice it any place below St. Joseph.

MR. SCHOENLAUB: I believe that is all.

MR. BROWN: I would like to clarify one thing for Mr. Kurylo here.

Q. (By Mr. Brown.) You were referring, I believe, to general rises in the Missouri River itself? You talk about the general rise and you generally have one rise in addition to that?

A. That is right, usually have about two high waters that you can count on that you can say, well--but the rest of them, the way that the land has been cleared and whenever it rains, it runs directly into the river; nothing goes in, it is a fast runoff; you get a quick rise and a quick fall and we notice that because that wrecks our channel.

Q. But in addition to that you have almost constantly, particularly during the early summer months, floodings in certain of the tributaries, for instance Squaw Creek has been out two or three times this year, Platte has been out at least three or four times?

A. Yes.

Q. Any time any of those tributaries go out at that point they dump a lot of debris in the river, don't they?

A. That is right, yes, sir.

Q. So in addition to the two periodic rises you have innumerable smaller rises constantly occurring?

A. Any time you get as much as a 2 to 3 inch rain any place in this stream you are going to get a rising river.

Q. Didn't used to get that before they straightened and dammed and diked the river, did it?

A. I wouldn't say dammed and diked it. I think the farmer cutting their timber caused it.

MR. BROWN: To me it is a combination of the two.

That is all.

MR. EDELMAN: The witness didn't say it is a combination, Mr. Chairman.

CHAIRMAN SAMSON: Well, does he care to answer?

A. (By Mr. Brown.) Will you answer that?

MR. JOHNSON: Is that a question?

MR. BROWN: Yes, I will ask him a question just to clarify it.

Q. (By Mr. Brown.) Isn't it a fact that with the straightening of the river, the confining of the river, the fact that the Missouri River is some 231 miles shorter than it originally was, that any water that gets in the Missouri River has to move faster and get to a given point quicker?

A. I don't know about the shortness. I think you are a little bit off on the 231 miles of shorter.

Q. According to the 1839 survey it is about 231 miles, I believe. You know more about that than I do. I know it is somewhere close to that. Anyway, what I am getting at is the farmer cleans his land, the water runs off his land, the Government confines it to a narrow straight course, the water gets to a given point quicker?

A. That is right.

Q. And you get higher water when it gets there?

A. And I could add a little bit more to it.

Q. I expect you could. And I agree in general.

A. That is right. But if they hadn't narrowed the river and straightened its course the farmer wouldn't have had any land.

Q. Well, there is a big question on that. Perhaps if we had left the Missouri River stream bottom as hazard land and put our money into contouring the terrace on the upper we would still be better off. There is a difference of opinion on that.

A. I don't think the farmer feels that way about it.

CHAIRMAN SAMSON: Is there anything further, gentlemen?

The witness may be excused.

(Witness excused.)

MR. STEIN: Dr. Ryckman.

DR. D. W. RYCKMAN,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Will you give your name and address, Dr. Ryckman?

A. My name is D. W. Ryckman, 1000 Joanna Avenue, St. Louis, Missouri.

MR. EDELMAN: Let the record show that Dr. Ryckman was sworn earlier.

MR. BROWN: May I ask how you spell that last name, please?

A. That is R-y-c-k-m-a-n.

Q. (By Mr. Edelman.) What is your occupation?

A. I am a consulting engineer and Director of the research and graduate program at Washington University, St. Louis, Missouri.

Q. How long have you been associated with the university, Dr. Ryckman?

A. Well, I have been associated with universities for about 19 years; with Washington University 3 years.

Q. What formal degrees do you hold?

A. I have a Bachelor of Science in civil engineering from Rensselaer Polytechnic Institute, Master of Science in civil engineering from Michigan State University, and a Doctor of Science in sanitary engineering at MIT.

Q. What professional experience have you had in the field of sanitary engineering?

A. I have had over 13 years of experience in teaching, consulting and research in the field of sanitary engineering, specializing in water purification and waste water treatment.

Q. Are you a member of any professional societies in this field?

A. Yes, I am.

Q. Could you tell us some of them?

A. I am a member of the American Society of Civil Engineering, of the American Water Works Association, of the Federation of Sewage and Industrial Wastes, Missouri Water and Sewage Conference, the American Society of Engineering Education, I am a registered engineer, a member of Sigma Xi, Chi Epsilon, Tau Beta Pi.

Q. That is enough. In connection with the studies which you have indicated, Dr. Ryckman, have you studied the problem created by taste and odor causing materials in water supplies?

A. I have.

Q. Can you briefly describe the nature of these studies?

A. We are engaged in a number of studies with taste and odor problems and have conducted a good number of studies, both on the consulting basis and on the research basis. One extensive program is in cooperation with the Missouri Monitoring Group, the Missouri River Monitoring Group, in which they are extracting odorous materials at various stations along the Missouri River on both the raw and tap waters extending from Yankton, South Dakota, downstream. At Washington University I direct research in various phases in cooperation with this group. They fall in three categories. One is the actual measurement of these odorous materials; two, the action of various oxidants on these materials; and three, in the characterization of these materials.

Q. Did your studies also indicate possible sources of these materials along the Missouri River?

A. That is the purpose of this study, is the characterization of these.

Q. I see. Have your studies so far indicated the source of these materials?

A. No, they have not.

Q. Have you made a study and analysis of materials with taste and odor significance discharged from the St. Joseph area into the Missouri River?

A. I have.

Q. When was that study made?

A. July 1959.

Q. What samples and data were used in making this study?

A. Data on the flow, estimated flow, of the waste, both municipal and industrial, from the St. Joseph area and samples of the industrial and municipal waste furnished by the U. S. Public Health Service.

Q. Were these samples taken in accordance with your direction?

A. They were.

Q. Were these samples analyzed by you?

A. They were.

Q. Can you tell us very briefly the method of analysis that was used?

A. The method of analysis was directed towards determining the quantity of odorous materials in the waste. Therefore, the chloroform extraction procedure was used.

Q. When you say odorous, Dr. Ryckman, do you mean that this material at the time of its discharge actually has a smell or can produce an odor in finished water?

A. That would depend upon what we are talking about. For analysis it is the odor that it has at the time of the analysis. However, through our studies and the proper methods of running an analysis, the two are the same.

Q. Did the method of analysis that you have described--are those methods accepted by the sanitary engineering profession?

A. They are.

Q. Did you find any material in the samples taken from discharges at St. Joseph, Missouri, to contain the odorous or taste and odor causing material?

MR. SCHOENLAUB: Your Honor, until such time as evidence or testimony is produced concerning the method in which these samples were taken and evidence of the samples themselves, we object to any testimony concerning any tests made on them.

CHAIRMAN SAMSON: I wonder if counsel could prepare just a little better foundation on that?

Q. (By Mr. Edelman.) Could you tell us where these samples were taken, Dr. Ryckman?

A. The samples were taken from the municipal and industrial waste outlets in the City of St. Joseph.

Q. Can you tell us how they were taken?

A. They were taken--

MR. SCHOENLAUB: If he from his own personal knowledge knows how they were taken.

MR. EDELMAN: Mr. Schoenlaub, he has already testified that they were taken in accordance with his direction.

MR. SCHOENLAUB: He didn't state that he saw them taken, though, Your Honor.

CHAIRMAN SAMSON: Will you go ahead with your foundation?

Q. (By Mr. Edelman.) Did you direct the taking of these samples, Dr. Ryckman?

A. Yes, I would say I directed them.

Q. Can you tell us how these samples were taken?

A. The responsibility for taking the samples was a U. S. Public Health Service responsibility. The samples were taken by what I considered people, engineers, who would take--would know how to take samples. I did not, however, and it was not my responsibility to take the samples.

Q. But these engineers knew the purpose for which these samples were to be taken?

A. They certainly did.

Q. And as far as you know they followed the standard and accepted procedure in taking these samples?

A. I should hope so.

MR. SCHOENLAUB: But you don't know?

A. I don't know?

MR. SCHOENLAUB: You didn't see them taken?

A. No, sir.

MR. EDELMAN: I submit it is not material whether he saw them take them, Mr. Chairman. He directed the taking of the samples; they were taken in accordance with accepted method and submitted to him.

MR. SCHOENLAUB: He doesn't know whether they were taken in accordance with acceptable methods and he has stated that these people weren't responsible to him for the samples, they were responsible to the Public Health Service.

MR. STEIN: Mr. Chairman, I am not sure whether Mr. Schoenlaub is objecting to questions of Mr. Edelman or he is embarking on cross-examination of the witness now. I wonder if that could be clarified?

MR. SCHOENLAUB: I am trying to clarify--

CHAIRMAN SAMSON: I believe it is a matter that can be developed on cross-examination and for whatever evidentiary purpose or benefit it is I am going to permit this witness to answer.

So with that reservation, I am over-ruling the objection.

Q. (By Mr. Edelman.) After this analysis did you identify odorous material in the samples taken from sewage wastes entering the Missouri River in the vicinity of St. Joseph?

A. Yes, I did.

Q. Did you make any interpretation or analysis of the amount of this material you found?

A. Yes, I made some analyses and some computations which I prepared.

Q. What did these computations show?

A. Can I refer to a chart which I prepared?

Q. Yes, indeed.

MR. EDELMAN: I would like to have it marked for identification.

I ask to have the chart titled "Characteristics St. Joseph Wastes" marked for identification as Government Exhibit No. 18.

(Government's Exhibit No. 18 marked for identification.)

Q. (By Mr. Edelman.) You may refer to that chart in your testimony, Doctor.

A. You asked me if I found odorous materials in the waste analyzed from St. Joseph. This is a chart which shows the amount, quantities, of odorous materials. These are indicated here (indicating) as the total chloroform soluble organics. They amount to a concentration in the combined municipal-industrial wastes of approximately 31 milligrams per liter, amounting on the basis of the flow data given to us to around 4,282 pounds daily. The further analysis of this total odorous material was made in order to determine the constituents of the neutral and weak acid groups, which through our work we have shown constitute the greatest, the most, odorous of the chloroform soluble odors fraction. You will note that the neutral group contain 37.8 percent of the total sample; the weak acid 43.5 percent. The two of them combined amount to 80 percent of the total chloroform soluble material, and this, I feel, is significant.

Q. Why is that significant, Dr. Ryckman?

A. It is significant because in our studies on various odorous materials coming from waste, both municipal and industrial, that the odors can--the majority of the odors can be concentrated in those two groups.

Q. Can you tell us to what extent this material that you found to exist on analysis persists in the Missouri River?

A. Yes, I can give you some information on that.

Q. Yes. Please go ahead.

MR. BROWN: Now, just a moment. Unless it is information that he collected himself or definitely knows about it I am going to object to it. I don't want him to read a treatise by somebody who isn't present or something like that. That is purely hearsay.

Q. (By Mr. Edelman.) What is your information based on, Dr. Ryckman?

A. It is based on work which we have done in our own laboratories.

MR. BROWN: I have no objection if you did the work yourself.

A. In this case. In fact, I would like to inject that I plan to give only factual information, opinions done only where we have--where I have a basis on which to do so. Our responsibility is primarily research.

Q. (By Mr. Edelman.) Will you proceed, Dr. Ryckman.

A. I have a chart which shows the persistence of chloroform soluble odorous material in streams under simulated stream conditions.

Q. Do you have that chart with you?

A. Yes, I do.

MR. EDELMAN: I ask that it be marked as Government Exhibit for identification 19. And it is entitled "Degradation of Chloroform Soluble Organics under Simulated Stream Conditions".

(Government Exhibit No. 19 marked for identification.)

Q. (By Mr. Edelman.) This chart is a visual presentation of your conclusions, is it not, Dr. Ryckman?

A. This is a chart showing the results of the degradation of chloroform soluble organics taken from river water in the St. Joseph-Kansas City area.

Q. And it is an accurate reflection of data you obtained?

A. This is taken from actual laboratory studies.

Q. Will you proceed.

A. Of the total chloroform soluble material, this odorous material was subjected to degradation methods similar to which you find in streams and we found that 14 percent of the material was removed in 20 days or less. That was the greatest amount of degradation that in any of our studies of any of this chloroform soluble material we have obtained was removed. Now, that remaining persisting--the material persisting after 20 days amounted to 86 percent.

Q. On the basis of your knowledge, your experience and your study of the question can you tell us whether, in your opinion, if this material were put into the Missouri River at about St. Joseph, Missouri, it would follow this degradation pattern?

A. Yes.

MR. EDELMAN: At this time the Government offers in evidence Government's Exhibits Nos. 18 and 19.

MR. BROWN: I would--go ahead.

MR. SCHOENLAUB: I would like to inquire of the witness further before objecting to the admission of those exhibits.

CHAIRMAN SAMSON: Very well. You may proceed, Counsel.

MR. SCHOENLAUB: Back to Exhibit--

CHAIRMAN SAMSON: This relates to the foundation, Mr. Schoenlaub?

MR. SCHOENLAUB: Yes.

CHAIRMAN SAMSON: Yes.

MR. SCHOENLAUB: Back to Exhibit 18, would you state again where the samples you used in your tests came to you from? I mean where did you get the samples?

A. In my laboratory.

MR. SCHOENLAUB: That was the first you saw of them?

A. That is right, sir.

MR. SCHOENLAUB: And where did you get the information concerning the flow of the Missouri River?

A. The U. S. Public Health Service.

MR. EDELMAN: Mr. Chairman, if the Board feels that this is a real problem, we can obtain the individual, he is in Kansas City, bring him down here tomorrow. In our view, Dr. Ryckman has testified that he knows the people who took the samples, they are responsible engineers, he has confidence in them, and he knows the procedures they followed and I submit that that is enough to make these samples accepted.

CHAIRMAN SAMSON: Very well.

MR. SCHOENLAUB: Your Honor, until such time as that person is brought in and the chain of evidence has been traced from the sewer outlets at St. Joseph to the doctor's laboratory, I object to the admission of both of those exhibits.

CHAIRMAN SAMSON: Well, Mr. Schoenlaub, in view of the statement of counsel for the Government, together with the testimony of Dr. Ryckman, realizing that possibly there is a chain there that hasn't been traced all the way from the river down to the laboratory in St. Louis, I am going to over-rule your objection.

MR. BROWN: May I ask the doctor a question?

CHAIRMAN SAMSON: Surely, Mr. Brown.

MR. BROWN: I don't know too much about this. You have caught me off first base. But I assume when you say total chloroform soluble organics those are odorants which are soluble in chloroform?

A. That is right.

MR. BROWN: And you have limited your odorants to that class which is soluble in chloroform?

A. That is right. There is a specific reason for that.

MR. BROWN: Now, is there a reason for that?

A. Yes, there is.

MR. BROWN: Why is that? I am trying to learn. I don't know.

A. Right. We are, too. The reason for using the total coliform soluble material--excuse me--chloroform soluble material--these are terms that sanitary engineers are all using these days--is that we want to get the trees out of the forest. If we use the total amount of organic matter we would have a large amount of material, much more organics, but we would not be concentrating on the portion that we are interested in. the odorous portion, and we know, our studies have shown us, that if we study the chloroform soluble material that we have the majority of the odorous constituents.

MR. BROWN: Well, help me a little further. Now, your first two classifications comprise 80 percent; the first one is about 32 percent and you term it neutral. What do you mean by that?

A. Well, actually, here again, just as we explained that we are using the chloroform soluble material rather than the total organic material, these various groups, the neutral, weak acids, are common ways of fractionating organics by the chemists to obtain the portion which carries the greatest odor potential. Therefore, they are significant for that reason. Neutrals in themselves are a group of organic compounds. It would be meaningless for us to tack a lot of names to them. They still represent a great portion. They are the oxygenated derivatives, the olfactic groups, the aromatic groups and such things as that. And these again represent a whole array of organics.

MR. BROWN: This represents the major portion of the organic material which could produce odor?

A. Right.

MR. BROWN: But not necessarily all of them?

A. Right.

MR. EDELMAN: Mr. Chairman, could I interrupt? The Government hasn't finished its direct examination. While we appreciate the questions of Mr. Brown which have helped clarify the witness's testimony, if he intends to pursue this as cross-examination--

MR. BROWN: No, I merely wanted to get such preparation to know whether I should object or not.

MR. EDELMAN: Oh, fine.

MR. BROWN: Since it does not include it all I think I should object and I do object. I don't think it is a proper exhibit at the present time.

CHAIRMAN SAMSON: Over-ruled. You may proceed.

Are you through on your questions on foundation, Mr. Brown?

MR. BROWN: Yes, I am through.

CHAIRMAN SAMSON: I didn't mean to limit you.

MR. BROWN: That is perfectly all right. I am merely trying to find out.

CHAIRMAN SAMSON: Would you care to pursue your line of questioning on foundation?

MR. BROWN: No, I found out all I wanted.

CHAIRMAN SAMSON: All right. Thank you.

(Government's Exhibits Nos. 18 and 19 received in evidence.)

Q. (By Mr. Edelman.) Can you tell us the significance of these chloroform soluble organics in the operation of a water treatment plant?

A. Yes, I can.

Q. Will you please tell us what problems they present?

A. I can tell you something about it. In our studies on both the raw water samples and the tap water samples we are finding that the water treatment procedures, plant procedures, as presently practiced by the plants on the Missouri River are not significantly reducing them. We have these materials in our drinking water.

Q. Did your study disclose whether or not the municipalities downstream in the Missouri River had increasingly difficult taste and odor problems in their drinking water?

A. Some of our studies have.

Q. Can you tell us what those are?

A. Those studies are done in cooperation with the Missouri River Monitoring Group and the relative amounts of those materials I don't have at hand. I think there are other people better qualified to bring that information to you.

Q. What I am getting at, is it your opinion that Kansas City, Kansas, has a greater problem than Leavenworth, that Leavenworth has a greater problem than Atchison, Atchison has a greater problem than St. Joseph?

A. Well, I can say that, that based on our studies that the amounts of odorous materials increase as you proceed down the river from Yankton, South Dakota, to the St. Louis area.

Q. Do you have an opinion as to why that increase occurs?

A. Yes, I have an opinion.

Q. What is that opinion?

A. I have an opinion based on two things. One is that our analysis of wastes which are discharged to the Missouri River for odorous material contain considerable quantities of chloroform soluble organics. St. Joseph, for example, based on the flow data, would be discharging an average of somewhat over two tons a day into the river. They are not the only city that is doing this. They are not the only industry that is doing it. The second condition is that our studies indicate that this material is not being readily degraded under stream conditions. Therefore, my opinion is that I am concerned about the discharge of this material to the river with the stream not showing signs of reducing it.

Q. Did I understand you earlier to say that water treatment plants are unable to remove this material in their treatment?

A. As presently practiced they are not removing it.

Q. Are you aware of the method of operation of the water plants at Atchison, Leavenworth, Kansas City and St. Louis?

A. I would say out of that--

Q. You know the treatment they have?

A. Yes, in general. Some of them I visited and some I know very well, others in general I have reviewed the type of treatment that they have.

Q. Did you hear Dr. Walton's testimony this morning?

A. Yes.

Q. And he described the method of treatment at all of these cities except St. Louis?

A. Yes.

Q. He described Atchison, Leavenworth, and Kansas City?

A. Yes.

Q. Now, based on what you heard this morning and your own knowledge of the water treatment processes at these plants and your knowledge of the presence of this chloroform soluble organics in the Missouri River, do you consider the material added at St. Joseph, Missouri, adversely affects the quality of potable water at these downstream communities?

A. I would expect that it would.

Q. Doctor, is it possible for a community such as St. Joseph, Missouri, and the associated industries which now discharge untreated domestic and industrial wastes to do anything to reduce the amount of this organic taste and odor producing material which they now discharge into the river? Can they do anything to reduce the amount of the discharge of this material?

A. Yes. Yes, they can.

Q. What can they do?

A. Well, there are a number of ways that show promise. As to what is the most efficient means, that would take a separate study, but certainly primary sedimentation, normal primary treatment methods, I would expect them to reduce them. I would expect that one should also consider for a good quality water to investigate the other methods of treatment along with this.

MR. EDELMAN: We have no further direct examination, Mr. Chairman.

CHAIRMAN SAMSON: I take it that there is no examination or cross-examination or any examination of any kind by the States of Kansas and Missouri?

Do you have some cross-examination, Mr. Schoenlaub?

MR. SCHOENLAUB: Yes.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. On these tests which you made of the samples furnished to you, Doctor, have you made any similar tests on water taken from the Missouri River at the intakes at Atchison, Kansas?

A. I have, I have one sample from Atchison, Kansas.

Q. And what were the results?

A. May I-- Did you say on the wastes from Atchison, Kansas

Q. No--

A. From the water?

Q. At the water intakes which would be above their sewers?

A. I have one sample taken from the intake at Atchison, Kansas, and also from the tap water at Atchison, Kansas. This indicates that there is chloroform soluble material there in both the raw and the tap water.

Q. To what extent compared with what you found at our sewer outlets?

A. This is actually in progress and all I can say is that it is there and that it is odorous and as far as to the amounts and quantities, it is entirely preliminary.

Q. Are these chloroform soluble organics injurious to the health as such of the people?

A. You are in an area and your question is a good deal like asking whether strontium 90 is injurious to your health. You are in an area where we need further research. There are some indications to show that we should be concerned about the physiological effect of these materials.

Q. Have there been any samples taken from the Missouri River north of St. Joseph?

A. Oh, yes.

Q. And what were the results of those tests?

A. We have a sampling station at Omaha, Nebraska, and also at Yankton.

Q. Right directly north of the city at the city's water or the water plants intake tubes, have you taken any samples?

A. At the water--

Q. Have any samples been furnished to you from the area of the St. Joseph Water Company?

A. This is a cooperative effort with the Missouri River Monitoring Group, of which I am a member, and we are all doing it together. It is our responsibility.

Q. But you don't know whether or not there have been any samples taken from the Missouri River at the St. Joseph Water Company intake pipes?

A. Oh, yes, there has been. Yes, this is another point of our sampling station.

Q. Could you give me a result of those tests?

A. I can tell you that there is odorous materials found at the water intake at St. Joseph.

Q. The same probability, then, of dangers to the health of the people would exist at the St. Joseph Water Company intake tubes as exist at the sewer outlets?

A. No, when you get into probability or possibility you get into relative amounts and there is a difference.

Q. But you don't have any comparative tests that you could use today at this hearing?

A. I can say generally that the amounts of materials increase as you go downstream on the Missouri River.

Q. But you have the results of no concrete--or no tests which would bear that out with you today?

A. I do not.

Q. You have no comparison between the water at the St. Joseph Water Company intake as compared with that at the Atchison Water Company intake?

A. I do not.

Q. You also stated that there were increasing difficulties in odor problems on the Missouri River. Will you explain that?

MR. EDELMAN: Did you say increasing difficulties or concern?

Q. (By Mr. Schoenlaub.) I think that was a yes answer you gave to a question presented by counsel to the effect are there not increasing difficulties in odor problems on the Missouri River and your answer was yes.

MR. EDELMAN: As you go downstream.

A. As you go downstream--excuse me. If the question was as you go downstream, my answer stands that there are increasing difficulties as you go downstream.

Q. You stated that primary sedimentation of sewage would reduce this, is that correct?

A. I would expect that it would reduce it.

Q. Is there not primary sedimentation of the raw water in the water treatment plants?

A. There is.

Q. Would not that have the same effect as the same sedimentation at the source of the sewage?

A. You can not do that in engineering. You can't extrapolate in that way. There is a great deal of time difference between the point of putting the material in the water and through the sewer and to the--until it comes into the water intake. There is time for that material to break up, there is time for it to dissolve, and, therefore, I would say anyone would be on poor grounds of making an interpretation on that basis.

Q. You also stated that the water treatment procedures of plants on the Missouri River were not significantly reducing these materials and that as a result we have these odors in the water.

A. That is our finding.

Q. Is that true at Atchison, Kansas?

A. I have not studied that.

Q. At Leavenworth, Kansas?

A. I have not studied that.

Q. One more question. What is a chloroform soluble organic?

A. Well, it is a material which is soluble in chloroform and has a particular significance in the study of odorous organics.

Q. What is that significance?

A. That it is odorous when based upon our studies of wastes in both municipal and industrial.

MR. SCHOENLAUB: I believe that is all.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Dr. Ryckman, if I understand you correctly, then, your part in this presentation is to show the odors that persist in the river from organic wastes?

A. That is right.

Q. You suspect that it may be harmful to human life, but you are unable to say so?

A. That is right. However, it is important enough that research work is being conducted on it both by industry and by research--

Q. There was a time when tomatoes were considered poisonous.

A. Pardon?

Q. I say there was a time when tomatoes were considered poisonous.

A. Is that right?

Q. Oh, yes. Research has shown that it wasn't. Now, while you suspect this, you are unable to say definitely or with a reasonable certainity that this is or is not dangerous to human life?

A. I can simply say that there is enough significance so that we place it high on the priority of our research, that is all I can say.

Q. All I am saying is, that being true, you can not say with reasonable certainty that it is dangerous?

A. I did not say so.

Q. And can not?

A. I would simply say that I would be willing to study it to ascertain it and place it high on my priority list.

Q. Could you answer my question? You can not say at this time with reasonable certainty that it is dangerous?

A. That is right. However--

Q. All right, sir.

A. --I would not say that it is not dangerous.

Q. No, I did not say that, but I did say that with reasonable certainty you can not say it at this time. I just want a straight answer to a straight question. You understand the question and that is correct, isn't it?

A. That is right.

Q. All right, sir. Now, you have sampling stations you say as far as Yankton?

A. That is right.

Q. You do not go up to Pierre or on north up to Mandan or Bismarck?

A. No, no.

Q. And it is my understanding of your testimony, these odorants are organic wastes soluble in chloroform?

A. That is right.

Q. And they increase in volume as you go downstream?

A. That is right.

Q. And I assume you would agree that every tributary of the Missouri River dumps in a certain amount of organic waste?

A. Yes, that is right.

Q. And every time there is a rain on the land surrounding it some organic waste may be washed in by that rain?

A. That is right.

Q. And that is the reason that as you go downstream you get greater concentrations of these odorants?

A. No, sir.

Q. Is that not the reason?

A. You can not say that.

Q. All right, I want to know.

A. You can not say that.

Q. Well, what is the contrary? You tell me what the facts are. I am not the professor.

A. You can say it is a factor. But when you compare the amounts of chloroform soluble odorous material in streams which have received only runoff from land and streams which have received domestic and industrial wastes, the streams that receive these wastes and extractions of wastes themselves show that there is much more of these chloroform soluble materials in waste waters than there is from natural runoff. Therefore, you can not extrapolate from that that the increase is due to the tributary

Q. You live on the Mississippi, don't you, St. Louis?

A. Well--

Q. Well, I mean your water supply is from there?

A. We live in the area of the Mississippi and the Missouri Rivers.

Q. Isn't it a fact that the greatest problems with odors and tastes in the Missouri and Mississippi River water come in the period of high waters?

A. I would say not.

Q. You don't think it does?

A. No.

Q. You don't think that the water treatment plants have the most trouble getting rid of the odors when there is high water?

A. My experience with the waterworks' people has been that this is not true.

Q. You took samples of the intake water at St. Joseph, at the water company's intake?

A. That is right.

Q. And found that had these odorants, organic odorants, in significant quantities?

A. That is right.

Q. Did you take samples of the tap water?

A. That is right, sir.

Q. And you found them in there also?

A. That is right, sir.

Q. Have you tried our tap water here in undiluted form to find out whether you can get a smell or a taste out of it?

A. Not directly. I think I had some iced tea.

Q. Would you try that water right now and tell me if you can detect a taste or an odor in it?

A. I would be glad to.

Q. All right, suppose you do that.

A. (Drinking.)

Q. Can you detect an organic taste in that?

A. I detect a taste.

Q. An organic taste from waste material?

A. I detect a taste.

Q. Well, there are thousands of kinds of tastes.

MR. EDELMAN: Mr. Chairman, there is no evidence that the water in these pictures is tap water.

MR. BROWN: Oh, no. You furnished the water. I assume you furnished tap water.

MR. EDELMAN: If our engineers furnished it, it is distilled water, Mr. Brown.

Q. (By Mr. Brown.) Can you detect an odor in that water?

A. Yes, I can.

Q. You can? Of inorganic waste?

A. Pardon?

Q. Of organic waste?

A. I would not venture to say what it is. I think it would be meaningless.

Q. You think this water, then, has both a taste and an odor?

A. Pardon?

Q. You think it has both a taste and an odor?

A. Yes, it does.

Q. Disagreeable?

A. I would say yes.

MR. BROWN: That is all I want to know. Thank you very much.

CHAIRMAN SAMSON: Any cross-examination by any of the other interested industries?

MR. STEIN: Mr. Metzler has one.

CHAIRMAN SAMSON: State your appearance for the record, please.

MR. METZLER: I am Dwight F. Metzler, Chief Engineer, Kansas State Board of Health, Topeka, Kansas.

May I ask a question for the State of Kansas? It seems to me there has been one facet of this that might have been overlooked. I would like to ask a single question.

CHAIRMAN SAMSON: Go ahead.

Q. (By Mr. Metzler.) It is not true that this method that you described here, Dr. Ryckman, is fairly specific for differentiating between organic material coming from industrial wastes and municipal sewage and that from normal runoff? I call your attention or recollection to the comparison, for example, between the Columbia River, which receives large volumes of surface runoff, obviously, and the very low amount of chloroform soluble organics there as compared to the Missouri River here. Isn't it true that this is a specific method that it does primarily measure organics from municipal and industrial wastes?

A. Yes.

CHAIRMAN SAMSON: Any further questions from you gentlemen?

MR. BROWN: No, I have none.

CHAIRMAN SAMSON: Any questions from the Board?

I have a question or two, Doctor.

Q. (By Chairman Samson.) Can you associate this breakdown, as for instance neutral and weak acids and strong acids and amine, in your judgment where do they--what precipitates those conditions? Where is that neutral substance coming from?

A. Well, in this particular case, of course we are dealing with waste, with materials that came from municipal or industrial wastes, so it came from municipal and industrial wastes. And I can give you the figures on it, too, individually, both the municipal and the industrial wastes. It is coming from the organics introduced into the waste by--of animal and vegetable origin.

Q. Then, in other words, that neutral material in the organic group does originate from an animal origin, would you say?

A. I would say primarily.

Q. What about the weak acid, what precipitates that or where does that come from?

A. That would come from the same source. We have both of these in domestic wastes and we have both of these in wastes from industries, whether it be the packinghouse industry or whether it be the chemical industry, petroleum industry, or any other.

Q. What about the strong acid, do you associate that generally with the same situation?

A. These also may come from the--a portion, of course, from waste from humans, but it is relatively low.

CHAIRMAN SAMSON: I have no further questions. Do you gentlemen?

MR. BROWN: Just a moment, please.

I have got so much stuff here, would you give me just a moment to go through some of this?

CHAIRMAN SAMSON: Certainly.

I wonder if now wouldn't be a good time to declare a little recess. In that connection I would like to say that this hearing may continue a little later than usual in view of the fact that, as I understand it, the Government has some witnesses that have to be out of town this evening and we may continue until 5:30 or a quarter of 6.

So why don't we take a little recess right now.

MR. STEIN: Mr. Chairman.

CHAIRMAN SAMSON: Yes.

MR. STEIN: We have one very important witness who has to get an airplane at 5:30. Now, if we are going to have prolonged examination, the time is getting rather close and we would either appreciate having him on now, and I understand Dr. Ryckman has to take the same airplane, or deferring the recess until after that witness. We expect direct examination of this witness to be very short.

CHAIRMAN SAMSON: What is your pleasure, then, gentlemen?

MR. JOHNSON: No recess.

MR. KURYLO: Let's go on through.

CHAIRMAN SAMSON: Let's go on through then. Is that agreeable?

MR. BROWN: Yes, I can ask him some questions now.

CHAIRMAN SAMSON: Very well. You may proceed, then.

Q. (By Mr. Brown.) Your testing procedure, Dr. Ryckman, then didn't take into consideration any testing for natural organic material?

A. It took into consideration anything that was in the waste.

Q. Well, as I understood your testimony, you were testing for organic material which would be coming in the waste from municipalities and industrial plants?

A. Right, that which--

Q. You didn't test for natural organic wastes that would come in from the stream banks or other places?

A. No. No, sir.

Q. So, in other words, you tested just for what you were looking for?

A. That is right, sir.

Q. You didn't make a complete test--

A. No, sir.

Q. --which would give us an over-all picture?

A. No, sir.

Q. That way we would get a much better picture, wouldn't we?

A. Not necessarily.

Q. Not necessarily, but probably?

A. I would say not.

Q. Don't you think in any scientific research the more factors you put into it and the broader basis upon which you consider it you get a much more satisfactory answer?

A. Absolutely not.

Q. You don't think so. All right, sir, let me ask you another question. Is there any evidence that there is any higher disease rate in St. Joseph due to our drinking water than the towns upstream?

A. I have no information on that.

Q. Any evidence that Atchison has any higher disease rate?

A. I have no information on that.

Q. Or Kansas City, Kansas?

A. I have no information on that.

Q. Now, your concentrations as you go east from Kansas City become higher, don't they? You have said that?

A. That is right, sir.

Q. Any evidence that any of the river towns like Lexington or Boonville, Glasgow, Lexington, any of those have higher disease rates?

A. I have not studied them.

Q. You have never heard of any of them having any higher disease rate due to this drinking water, have you?

A. I haven't investigated it.

Q. Isn't it a fact that on drinking water-- Have you ever been in New York? I assume you have many times.

A. Yes, sir.

Q. Do you notice any flavor in New York City's water?

A. I would rather not answer that question.

Q. That is some of the purest water in the United States, isn't it?

A. I can't answer that.

Q. Don't you know that thousands of people go there that are accustomed to other water and don't like the flavor or the taste at all?

A. (No answer.)

MR. BROWN: May I have just a second.

Q. (By Mr. Brown.) I will ask you a question and I am not too certain about it. How do you distinguish between ordinary greases which are chloroform soluble and odor significant substances?

A. By running threshold odors on them.

Q. Running what?

A. Threshold odors on them.

Q. How is that done?

A. That is done according to Standard Methods with a panel of people, five people, in our laboratory.

MR. BROWN: That is all I have.

MR. SCHOENLAUB: I have one more question.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Because of the odor and taste in our drinking water is that an indication to you that it might be dangerous to the health of the people of St. Joseph to drink it? Is that what you are working on?

A. I would say that I am concerned about it.

Q. In somewhat the same respect as other scientists are concerned about cigarettes and certain types of--

A. Absolutely.

Q. There is no proof that it might be a cause?

A. That is right.

Q. But that is the extent of your knowledge about the odors and tastes in the water?

A. Generally, yes. We do have some indications of toxic effects of them.

Q. In other words, you have not traced the odors to any disease-causing or producing organisms?

A. That has not been done.

MR. SCHOENLAUB: I believe that is all.

CHAIRMAN SAMSON: Any further questions?

The doctor has a question.

Q. (By Dr. Martin.) Of all the taste and odor-producing substances in water, could you say what percentage would be constituted under the heading "Chloroform Soluble Organics"? There has been some question raised about the completeness of this breakdown.

A. As to what percent the chloroform soluble materials represent the total odorous portion of the total organics, I would say that they represent the majority. I stand with what I said earlier, majority of the components constituting odor.

Q. More than 50 percent?

A. Pardon?

Q. More than 50 percent?

A. Absolutely, far more than 50 percent.

Q. One additional question. You said that when substances of this sort were passed through a sewage treatment plant that they were degraded. Can you give us any percentage figures for the extent of degradation of these chloroform soluble organics of average type as they pass through a sewage treatment plant?

A. I can not. I can not.

DR. MARTIN: That is all.

CHAIRMAN SAMSON: Mr. Poole?

Mr. Kurylo?

Q. (By Mr. Kurylo.) Do you know whether there is any additional significance between chloroform soluble organics and coliforms in addition to the similarity of the words?

A. No. No, I am sorry for that confusion.

Q. Is there any relationship between the existence of chloroform soluble organics in the water and the amount or the number of coliforms you might find in the water?

A. I would not want to say that there was.

CHAIRMAN SAMSON: Mr. Johnson?

MR. JOHNSON: No.

CHAIRMAN SAMSON: There will be no further questions. You are excused.

(Witness excused.)

MR. STEIN: Mr. Hartung.

HERBERT O. HARTUNG,
called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Will you give your name and address to the reporter?

A. My name is Herbert O. Hartung, H-a-r-t-u-n-g. I live at 45 Berrywood Drive in Glendale, Missouri, a suburb of St. Louis.

MR. EDELMAN: Let the record show that Mr. Hartung was sworn earlier.

Q. (By Mr. Edelman.) Will you tell us what formal degrees you hold, Mr. Hartung?

A. I have a B. S. in civil engineering.

Q. Have you published any papers in the field of water supply and water treatment?

A. I have contributed to the literature on a number of occasions.

Q. Can you tell us generally what some of them were?

A. The papers which I have written pertain to water purification and water plant management. I have written papers on chlorination, coagulation, disinfection, softening, and that type of paper.

Q. What is your present occupation?

A. I am a Vice-President and Manager of Production at the St. Louis County Water Company.

Q. How long have you been engaged in the field of water treatment?

A. I started in 1931, so that should make it 28 years.

Q. Are you a member of a committee composed of public water supply utilities with an interest in the quality of the Missouri River?

A. Yes, I am.

Q. Who are the other members of that committee?

A. The committee is composed of water treatment plant operators starting at Yankton, South Dakota, and proceeding downstream for a stretch of 800 miles, Omaha, Nebraska, St. Joe, Missouri, Kansas City, Missouri, Lexington, Missouri, Jefferson City, Missouri, St. Louis, Missouri, and St. Louis County, Missouri, and also as contributors to the data being collected by the test group committee we have a monitoring station now at Atchison, that is recent, and one also at the Kansas City Power and Light Company in Kansas City, Missouri.

Q. Has this committee studied the pollution problem in the Missouri River in the reach below St. Joseph, Missouri?

A. Yes, it has.

Q. As a member of the committee did you participate in the committee studies and its findings and conclusions?

A. Yes, I did. I am Chairman of that group, incidentally, and as Chairman of the group have been able to follow the work very closely and also direct some of its activities.

Q. Would you tell us what conclusions you have reached as a result of your study and as a member of this committee?

A. Well, we have noticed that the chloroform soluble organics increase between St. Joe and Kansas City, Missouri, the two stations on which we have a long-time record, and this--when this amount of material is added on to other material which reaches the river we become concerned regarding its effect on public water supply.

Q. Do you have a chart with you on this subject?

A. Yes, I do. I would like to show it.

MR. EDELMAN: May I have that marked as Government Exhibit 20 for identification?

(Government's Exhibit No. 20 marked for identification.)

Q. (By Mr. Edelman.) That chart is entitled "Average Increase in Chloroform Soluble Organic Extract below St. Joseph 1958."

A. Yes, the chart shows that the average increase in chloroform soluble material between St. Joe and Kansas City, Missouri, water plant is about 1,000 pounds per day and down to St. Louis, Missouri, about 13,000 pounds per day.

Q. Can you tell us from what data that chart was prepared?

A. Yes. Each one of these monitoring stations which I mentioned before continuously runs a quantity of water through carbon filters and then the carbon filters on a basis of predetermined routine and standardized methods, the carbon is taken from the filters and sent to an extraction laboratory. Then the extractions are made and the extracted material sent to Washington University for further analysis and compilations.

Q. Did the St. Joseph Water Supply Company supply you with information for this study?

A. Yes, as members of the Monitoring Committee they also operate one of these carbon filters and their carbon is sent to the Kansas City, Missouri, water plant laboratory for extraction and that extracted material then is sent to Washington University for further analysis.

Q. Does your water company use the Missouri River as a source of water supply, Mr. Hartung?

A. Yes, it does.

Q. Does the use of the Missouri River present any special problems to you as far as taste and odor is concerned?

A. Yes, it does. We are having to spend more and more effort and more and more facilities for the production of a palatable water. The removal of taste and odor substances is now becoming a very important part of our processing.

Q. As a member of the committee in terms of your relation with these water companies do you know whether the upstream plants, that is the plants farther up the Missouri River as far as Yankton, have the same degree of difficulty with this problem as you do?

A. No, the problem increases as you go downstream. The farther upstream you are the less the problem and the farther downstream the greater the problem.

Q. Do you know of any existing processes available to water treatment plants which can deal with the problem of taste and odor due to chloroform soluble organics?

A. Well, that question isn't easily answered because it must be defined in terms of quantity of organic materials that you are talking about. There have been organic materials in the Missouri River that have gone through the purification plants and have reached the consumers, as evidenced by consumer complaint and newspaper publicity. Obviously when that happens to the water plant it is to be regretted and he wishes he could do something about it. There are other times when these organic materials can be successfully removed by treatment processes which are now available to us.

I should like to point out there that all of these plants that I am talking about that are in this monitoring program have made purification plant additions and improvements within the last 10 years and most of them have within the last 5 years, indicating that none of these plants are obsolete. They are using the very latest technics and equipment available to the art and industry.

Q. Mr. Hartung, can you tell us whether in your opinion the taste and odor problems that you are encountering are due to algae or whether they are due to the chloroform soluble organics or something related to them?

A. Well, I am reasonably sure that they are due to these industrial wastes. And the reason I am reasonably sure about that is that we make microscopic counts from time to time on the raw water supply and they have not materially changed over the course of the years, but yet this organic material has increased in quantity and consequently it is only reasonable to assume that our problems are more related to industrial wastes than they are to natural algae which occasionally get into the stream.

Q. On the basis of your knowledge and studies of the situation, do you have any opinion as to the extent to which taste and odor causing material discharged to the river at St. Joseph, Missouri, contributes to your taste and odor problem?

A. Well, I can only say that every bit of pollution which is dumped into the river is an additive quantity to that which is dumped from other sources and consequently we are concerned about it. On the basis of the chart here, which isn't a complete record, it is a study over a period of 1958, the thousand pound increase to St. Joe represents 6 percent of the total which is down at St. Louis. I think it is significant. Whether somebody else thinks it is significant is immaterial. I don't believe the people at St. Louis or anywhere else ought to have to drink it.

Q. As Chairman of the Missouri River Pollution Monitoring Committee and in your official capacity with the water company do you have any opinion as to how the taste and odor problem faced by water plants in this section of the Missouri River can be alleviated or substantially reduced?

A. Well, I think the people who are dumping the material in the river have a responsibility to their neighbors to see that it is removed. We are not particularly concerned what treatment methods they use. We just hope they use some.

MR. EDELMAN: We have no further direct examination, Mr. Chairman.

CHAIRMAN SAMSON: Mr. Metzler, do you have--

MR. EDELMAN: Oh, at this point--excuse me.

At this point I offer in evidence Government Exhibit No. 20.

CHAIRMAN SAMSON: Objections, if any?

MR. BROWN: No, I have no objections.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 20 received in evidence.)

CHAIRMAN SAMSON: Cross-examination by the State of Kansas?

MR. METZLER: May I see what is developed on cross-examination here?

CHAIRMAN SAMSON: Very well.

MR. METZLER: Probably any questions I have will be cleared up.

CHAIRMAN SAMSON: Very well.

The City of St. Joseph, Missouri?

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. On this thousand-pound-a-day increase between St. Joseph and Kansas City and thirteen thousand pounds per day between St. Joseph and St. Louis--is that not correct?

A. That is right.

Q. --do you know what the increase is between Omaha and St. Joseph?

A. Yes. It is a similar amount, about a thousand pounds.

Q. And between other points upstream from Omaha all the way up to the start of the river?

A. Well, the only other data we have was--well, I don't have that data with me. There is some increase between Sioux City and Omaha which was developed in previous testimony given by myself. I didn't bring that with me, I am sorry.

Q. And above Sioux City?

A. Above Sioux City I do not have any records, except that we use Yankton as our base point and there is some increase between Yankton and Omaha.

Q. How far is it between Yankton and Omaha?

A. That is about 200 miles.

Q. And about what is the increase between those two points?

A. It is--well, on the basis of 1958 data it is probably on the order of around, oh, it is a little less than a thousand parts per mile--or a thousand pounds per day, rather. Excuse me.

Q. And approximately a thousand pounds per day between Omaha and St. Joseph?

A. Well, speaking in round numbers. I don't have those figures exact. I am not prepared to talk on them as such, but if you want to talk loosely, it is in that area.

Q. Approximately what would it be between your city in St. Louis and say another approximately 60 miles downstream?

A. The St. Louis Plant and Howard Bend Plant are almost adjacent to each other.

Q. I mean 60 miles downstream from St. Louis what would the increase be?

A. We have no data on that.

Q. You don't know whether there is any increase from St. Louis or not?

A. I don't know that, no.

MR. SCHOENLAUB: I believe that is all.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Do you have an opinion whether there is an increase below St. Louis?

A. Well, St. Louis have sewers, yes.

Q. I say do you have an opinion on it?

A. Oh, sure.

Q. What is the opinion?

A. The opinion is that there is pollution from St. Louis into the Mississippi River.

Q. Is that Hartung, is that the way you pronounce that?

A. Yes, that is right.

Q. You have been with the County Water Company there for some time?

A. That is right.

Q. Do you know how many customers, roughly, you have? How much do you pump a day?

A. The average pumpage is about 60 million gallons per day. We have had a peak day of 190 million this year.

Q. Now, have you ever had any complaint of any water-borne disease down there?

A. No. I hope we never do.

Q. Well, I do too, but you have never had any, have you?

A. No.

Q. Has the City of St. Louis ever had any water-borne disease?

A. There are some records of water-borne disease in St. Louis, yes.

Q. How far back and what was the disease?

A. Well, I am not prepared to really discuss them. All of this is hearsay and I think I had better stay out of the field.

Q. Does your committee, the committee of which you are Chairman, work with the Public Health Service?

A. The Public Health Service has been advisory to our committee. They furnish us information and considerable help.

Q. You have undoubtedly since this law was passed in '48 discussed these pollution problems with them many times?

A. Oh, yes, certainly.

Q. And you understand their over-all objectives?

A. Certainly.

Q. Does the Public Health Service under its present authorization hope to eliminate all or the major portion of the pollution in the Missouri River?

A. I have never discussed with them what they hope to do.

Q. You have no idea what they hope to do at the present time?

A. I can say what I hope they do.

Q. Do they expect to stop pollution abatement by stopping all municipal and industrial pollution or do they expect to stop all sources of pollution?

A. I think it would be fairer to have them answer that question.

Q. You don't know what their principal policy must be?

A. No, as an operator of a water utility I am concerned with substances in the river water which causes a deterioration in the water quality to our customers and consequently I am lending every effort and using every opportunity that I have to work for pollution abatement which causes a deterioration of public water supply in my area and also to those other people with whom I am cooperating.

Q. Have you tried our water here in an undiluted form?

A. No.

Q. Why don't you try a little of it?

A. I don't even know whether that is your water and I don't even know what the ice crystals--

MR. BROWN: Well, Mr. Chairman, there is a tap right outside the door here. Would you ask the witness to sample the water from the tap so there would be no question as to the source?

A. I don't think that particularly--I don't mind drinking the water.

Q. You do drink water at times?

A. Yes, I do, and I drink it too here. I feel reasonably confident that they are doing a good job here and I feel perfectly safe in doing that. I will stipulate that.

Q. As a water expert I would just like to have you taste it and tell me if in your opinion there is both odor and flavor in it?

A. Well, if you want me to do that, I don't think that that is particularly significant because what one person thinks is odorous and tastes is not acknowledged by another person.

Q. That is correct.

A. And if you are--

Q. I would like to see whether the experts for the Government agree. You don't object to tasting it, do you?

A. No.

Q. Well, suppose you step out here and taste it? I can assure you that is out of the tap, but if you don't want to take my word step out here and take it.

MR. STEIN: Mr. Chairman, I think Mr. Hartung is here as an expert on water processing, not a tasting expert.

MR. BROWN: Well, I think as a man he said his primary concern was to see that his public got water that was good in taste and odor and if that isn't an expert I don't know what an expert is so I want him to taste it and tell the citizens of this community and the press and the Board just whether or not St. Joseph water has flavor and odor to it.

A. Let me help you a little bit there.

Q. I need help.

A. All right. That isn't a very scientific way of doing it. Taste and odor determinations are not made by the method you are trying to get me to use at the present time. The procedure is much different and much more scientific. Usually you start off with a water which you know to be taste and odor free by reason of it having been carefully prepared by pouring it through activated carbon and removing all the oxidizing materials. That is your base. Then all your tasting is done on a comparative basis, not by one person but by two, three and four people who serve as a panel. Now, when you make these tastes you start making dilutions of your water with this taste and odor free water and you constantly build up to the place where you get a dilution which you start to taste. Now, for me to merely pick up this water and say that I taste something in this thing depends on what I had for lunch, what kind of night I had last night, and a lot of other things which causes that little old brown taste in the mouth.

Q. I want to know what kind of night you had.

A. All right, you want to know--

Q. You don't object to taste the water?

A. You want me to taste the water and tell you I had a bad night.

Q. All right.

A. (Drinking.)

Q. Wouldn't you consider that pretty good water?

A. Yes, it is pretty good water.

Q. Do you detect a flavor to it?

A. It is very slight.

Q. A disagreeable taste?

A. No, not disagreeable.

Q. Do you detect any odor at all?

A. No odor.

Q. No odor. That is all I want to know. Thank you very much.

A. All right.

CHAIRMAN SAMSON: Any further questions by any other interested industry?

Members of the Board? Doctor, do you have a question?

Q. (By Dr. Martin.) Well, perhaps we should ask Mr. Hartung whether his tasting with regard to water may not be conditioned by the water that he has drunk in St. Louis for long periods of time?

A. That also is a factor, yes.

Q. Your basis of comparison in tasting this water might be the water in St. Louis which you have drunk for a long time and which the chart behind you shows to contain very large amounts of taste and odor-producing substances.

A. The background of one's experience will determine what you call an objectionable taste or a flavorable taste. The reason I was trying to make the point a little while ago is that in a good taste and odor panel you start off with water that you know to be taste and odor free by reason of the processing which it has gotten before you adopt it as your standard. Certainly your background of experience has something to do with whether or not you would judge this to be taste and odor free or having a taste.

DR. MARTIN: Thank you, sir.

MR. BROWN: May I ask a question in view of Dr. Martin's question?

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Dr. Ryckman is also a fellow citizen of yours?

A. Sure.

Q. I assume he drinks the same water, has for a long time?

A. I trust he does.

Q. If it polluted your taste it should by the same token have polluted his, shouldn't it?

A. You can follow that logic if you care to.

MR. BROWN: I do. Thank you very much.

CHAIRMAN SAMSON: Any further questions by the panel?

Mr. Poole has a question of Mr. Hartung.

Q. (By Mr. Poole.) I just want to refresh my notes. If I understood you, Mr. Hartung, you said that above St. Joe there was an average of about--or between St. Joe and Omaha about a thousand pounds per day of chloroform soluble extract added to the river?

A. I tried not to be too definitive. I was talking in terms of generals because I do not have good notes here on that.

Q. But about a thousand pounds?

A. I would say in that area.

Q. And something in the same neighborhood as that between Omaha and Yankton?

A. It is a little less than that.

Q. Well, in other words, this chart, then, indicates that from the St. Joe area there is approximately 50 percent as much organic extract material added as there is added down to St. Joe?

A. Well, if you take my figures as the exact figures you will come up with that arithmetic, yes.

MR. POOLE: Thank you.

CHAIRMAN SAMSON: Any further questions by the Board?

Any further questions?

The witness is excused.

(Witness excused.)

CHAIRMAN SAMSON: Is it convenient now to take a short recess?

MR. STEIN: Yes, sir.

CHAIRMAN SAMSON: About 10 or 15 minutes.

(RECESS)

CHAIRMAN SAMSON: The hearing will be in order.

MR. EDELMAN: Mr. Kittrell.

F. W. KITTRELL,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Will you give your name and home address to the reporter?

A. My name is F. W. Kittrell. My home address is 7625 Forest Road, Cincinnati, Ohio.

MR. EDELMAN: Let the record show that Mr. Kittrell was sworn yesterday.

Q. (By Mr. Edelman.) Mr. Kittrell, the testimony you are about to give is subject to the oath you took yesterday. And what is your occupation, Mr. Kittrell?

A. I am employed by the U. S. Public Health Service as a Public Health Engineer.

Q. How long have you been employed there?

A. Almost five years.

Q. What is your position with the Public Health Service?

A. I am in charge of stream pollution studies.

Q. Can you tell us in general what the duties of that position are?

A. They involve generally the planning, organization, supervision and participation in certain phases and the conduct of studies of pollution, of the effects of pollution, on water quality, quantitative evaluation of those effects, and in some cases determination of needs in the way of reduction of contamination.

Q. Can you tell us generally and briefly how these studies and surveys are conducted?

A. In general they consist of reviewing the area involved, the streams involved, sources of wastes, and points of water use. They involve the selection of sampling stations that will yield the information that is needed, the determination of types of analyses that should be made, scheduling the collection of sampling and determining the frequency of sampling, and finally, after the data has been accumulated, the analysis and interpretation of the data and when reports are planned and the final preparation of the report.

Q. What employment did you have prior to joining the Public Health Service?

A. Immediately before I came with the Public Health Service I was employed by the Frederic B. Stevens Company in Detroit for one year. In that particular job, however, I had no duties in stream sanitation. Before that work I was with the Atomic Energy Commission at Oak Ridge for two years. Among my other duties there I was responsible for advice and consultation on the safe disposal of radioisotopes into sewage systems and streams. For the nine years before that I was with the Tennessee Valley Authority, during which time I was responsible for stream pollution studies, the effects of wastes on water quality, and also the effects of reservoirs and their operation on water quality. Previous to that for a period of 11 years I was with the Tennessee Department of Public Health, during which time many of my duties involved stream pollution studies, but in addition I had certain responsibilities for supervision of municipal water supplies and sewerage systems. For one year previous to that I worked in the sanitary water analysis of the North Carolina State Board of Health.

Q. What formal education have you had in sanitary engineering, Mr. Kittrell?

A. I received a B. S. or Bachelor of Science in Chemistry from the North Carolina State College in Raleigh, North Carolina, and I received a Masters degree in sanitary engineering from Harvard University at Cambridge, Massachusetts.

Q. In the course of your formal education and your experience have you become familiar with the nature of the health hazards presented by sewage pollution of a stream?

A. Yes.

Q. Can you tell us briefly at this time the nature of the hazard that is presented?

A. Well, the principal hazard is one to health and sewage contamination causes the most serious water-borne diseases, of course only if the pathogenic organisms discharged in sewage in some way find their way into the bodies, into the stomach and the intestines, of people.

Q. Now, in preparation for this hearing did you familiarize yourself and assemble information concerning the sources of waste entering the reach of the Missouri River between St. Joseph, Missouri, and Kansas City, Kansas?

A. Yes, I did.

Q. Will you tell us what sources of information you used?

A. I obtained information from the official files of our Public Health Service Regional Office. I obtained information from the official records of the State Health Departments of Missouri and Kansas. Additional information was obtained under my supervision by the chief in charge of my field party.

Q. Did you make any personal inspection and survey yourself?

A. Yes, I investigated several aspects of the problem in the field. I took a boat trip from the St. Joseph water front down to the Kansas City, Kansas, water plant intake, observing sewers, the presence of waste at the mouths of sewers, observing tributary streams, major tributary streams, and observing the characteristic of the main river as it might affect its reaction to the pollution discharged to it.

Q. Will you tell us what these sources are?

A. The sources of waste are sewage and industrial wastes from St. Joseph, Missouri, from Atchison, Weston--or Atchison, Kansas, from Weston, Missouri, from Leavenworth, Kansas, from the Kansas State Prison, and from Parkville, Missouri.

Q. On the basis of the information you obtained and the survey you made can you tell us the amount of the discharge from each of these sources?

A. Yes.

Q. Will you do so, please?

A. I have developed the data on the basis of two different methods of measurement. One is based on the bacterial contamination discharged from the several sources. The other is based on the organic waste discharges.

Q. Can you tell us how you computed the bacterial showing?

A. Well, the principal basis for the bacterial contamination is determination of the sewered population. We know about what quantities of coliform organisms may be expected from each individual each day, and so I have used the sewered population in the various towns involved as a measure of sewage contamination. I might add that with respect to the coliform organisms which also come from the packing house industry in St. Joseph I have used data obtained in other studies as a basis for estimate of computing the contribution from the packing plant area.

Q. Did you prepare a chart on this subject, Mr. Kittrell?

A. Yes, I did.

Q. Do you have it with you?

A. Yes.

MR. EDELMAN: I ask that this chart marked "St. Joseph, Missouri, to Kansas City, Kansas, sources of bacterial contamination" be marked as Government Exhibit No. 21 for identification.

(Government's Exhibit No. 21 marked for identification.)

Q. (By Mr. Edelman.) Will you tell us the scale on which that chart was prepared and describe it generally, Mr. Kittrell?

A. Yes. The small bar in the lower left-hand corner (indicating), the small red bar, of this chart, the height of that bar has been selected as equivalent to the bacterial contamination from a sewered population of 5,000 persons. The other bars on the chart, each located at its respective location with respect to the river (indicating), are in proportion to the small bar in the lower left-hand corner.

Q. That chart is a fairly accurate representation of the Missouri River and the relation--the distance between the points indicated thereon, is it not?

A. That is correct.

Q. Will you tell us, then, what your computations show?

A. From St. Joseph I have computed that the sewered population is about 63,000 persons, that portion of the contamination is indicated by the red portion of this bar (indicating). The lower portion of the bar which is brown (indicating) represents 20,000 sewered population, which I have computed as the coliform organism contribution from the packing plants. The sewered population of St. Joe represents 47.6 percent of all of the sewer contamination involved along this section of the river. That from the packing plants represents 15.1 percent of the total along this section of the river.

Q. What is the sum of those two figures?

A. The sum of these two is 62.7 percent of the total.

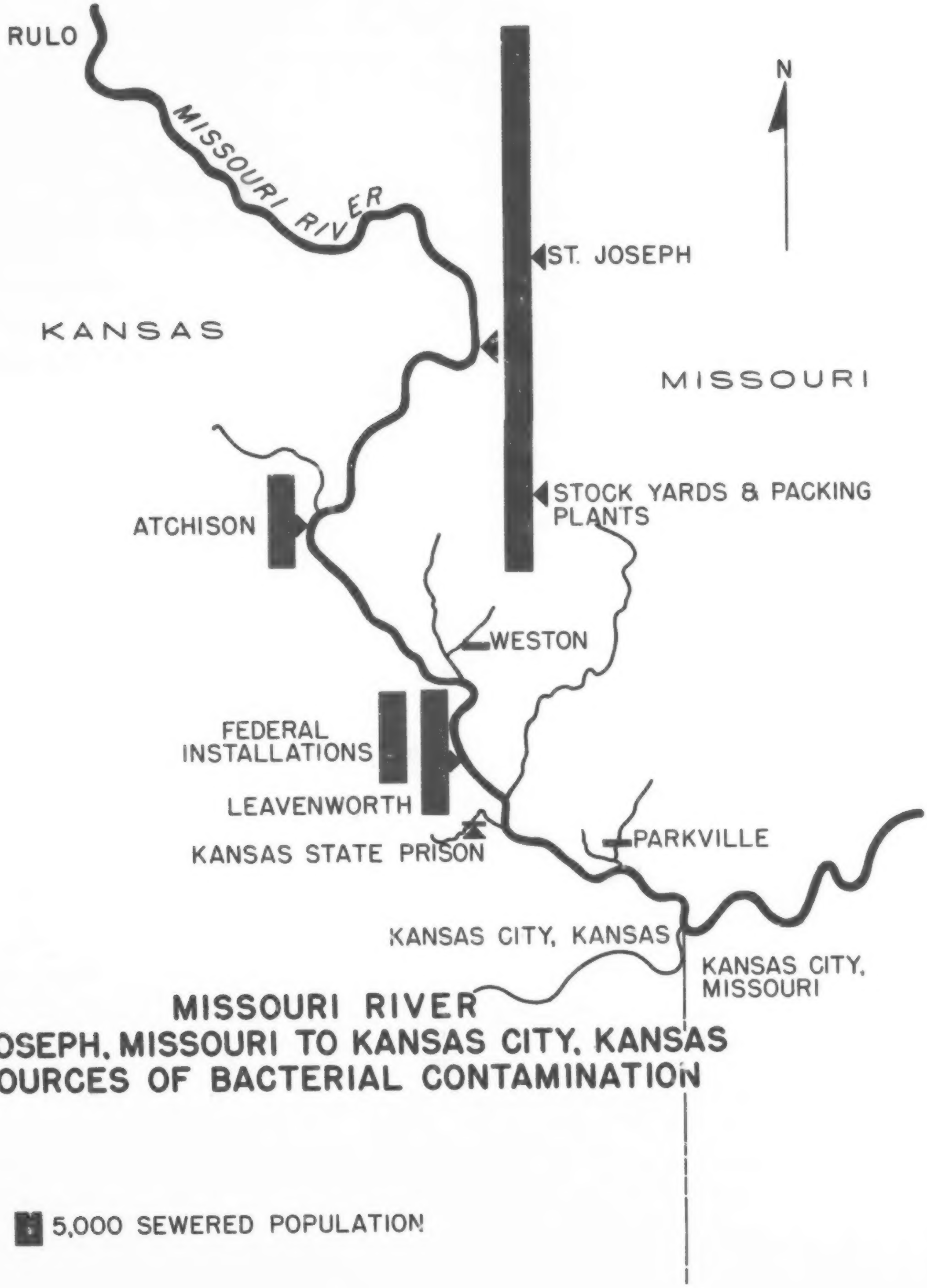
Proceeding downstream to Atchison, which is about 25 miles below St. Joseph by river, the estimated sewered population is 14,000, which is 10.6 percent of the total.

The next downstream source is a very small one, Weston, which is located on a small stream tributary to the Missouri, this is Weston, Missouri, and that has a sewered population of about 600 or one-half of 1 percent of the total.

In the Leavenworth area, which in turn is about 25 miles below Atchison, I have shown two charts--two bars, one of which represents, the large one (indicating), represents municipal sewered population of Leavenworth, which is 19,400, or 14.6 percent of the total. The other bar--

CHAIRMAN SAMSON: Would you give us those figures again on that last installation?

A. Leavenworth municipal sewerage has a sewered population of 19,400.


RULO
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ST. JOSEPH
KANSAS
MISSOURI
STOCK YARDS & PACKING PLANTS
ATCHISON
WESTON
FEDERAL INSTALLATIONS
LEAVENWORTH
KANSAS STATE PRISON
PARKVILLE
KANSAS CITY, KANSAS
KANSAS CITY, MISSOURI
▮ 5,000 SEWERED POPULATION

MISSOURI RIVER
ST. JOSEPH, MISSOURI TO KANSAS CITY, KANSAS
SOURCES OF BACTERIAL CONTAMINATION

CHAIRMAN SAMSON: Thank you.

A. Or 14.6 percent of the total.

The Federal installations, and there are three Federal installations, Fort Leavenworth, Federal Prison and the Veterans Administration Hospital, have a total sewered population of 14,050 or 10.6 percent of the total.

A short distance downstream from Leavenworth the Kansas State Prison discharges to a small stream that is tributary to the Missouri. The sewered population of the penitentiary is 2,000, but this is reduced by treatment, secondary treatment, to an estimated 200 as discharged to the river or this is 0.2 percent of the total.

Across the river downstream a little ways in Missouri is Parkville, Missouri, with a sewered population of 1,050 or 0.8 percent of the total.

All of these figures give a total of 132,300 sewered population.

Q. (By Mr. Edelman.) Are there any other sources of waste in this area reaching the Missouri River which you consider significant for this purpose?

A. No, none that I consider significant.

MR. EDELMAN: I offer Government Exhibit No. 21 in evidence.

MR. BROWN: I have no objection.

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 21 received in evidence.)

Q. (By Mr. Edelman.) Mr. Kittrell, did you prepare a chart showing the extent of the organic pollution computed in the same manner?

A. Yes.

Q. Do you have it there?

A. I have.

MR. BROWN: What kind of pollution, Mr. Edelman?

MR. EDELMAN: Organic.

I ask that this chart marked "St. Joseph, Missouri, to Kansas City, Kansas, Sources of Organic Pollution" be marked for identification as Government Exhibit No. 22.

(Government's Exhibit No. 22 marked for identification.)

Q. (By Mr. Edelman.) Will you tell us what your computations show, using the chart you prepared as a reference? First may I ask that you tell us the scale of that chart and generally describe it.

A. This chart is based on the accepted conversion of the strength of organic wastes in terms of biochemical oxygen demand or BOD.

Q. Mr. Kittrell, may I ask that you speak up. I am very close to you and have difficulty in hearing.

A. This is in terms, then, of population equivalent on the basis that I have just stated, and in the lower left-hand corner of the chart (indicating) is a red bar, the height of which is equivalent to 50,000 population equivalents. At St. Joe, the top portion of the bar, which is red, is equivalent to the organic wastes discharged through the municipal sewers. This is a total of 159,000. The remainder of the bar, the lower part, which is brown (indicating), is the population equivalent of the wastes from the stockyards and other industries discharging directly to the river. This represents a total of 485,000, for a total from St. Joseph of 643,300. Going back to the individual figures for the moment, the population equivalent discharged through the St. Joe municipal sewers are equivalent to 22.3 percent of the total from all sources in this section of the--along this section of the river. The packing plant and other industries discharging directly to the river are equivalent to 68 percent of the total, giving a total from St. Joe of 90.3 percent of all population equivalents discharged to this section of the river.

Q. Did you say 93.3?

A. 90.3.

Q. 90.3?

A. Yes.

The next downstream source is Atchison, Kansas, with an estimated population equivalent of 33,000 or 4.6 percent of the total.

Weston, Missouri, has an estimated population equivalent of 600, or 1/10 of 1 percent of the total.

In the Leavenworth area, again I have shown two bars, one for waste discharged through the municipal system, which has a population equivalent of 20,200 or 2.8 percent of the total. The Federal installations account for 14,050 or 2 percent of the total, giving a total from the Leavenworth area of 4.8 percent of the total.

The Kansas State Prison at Lansing, Kansas, discharges an estimated population equivalent of 630 or 1/10th of 1 percent of the total.

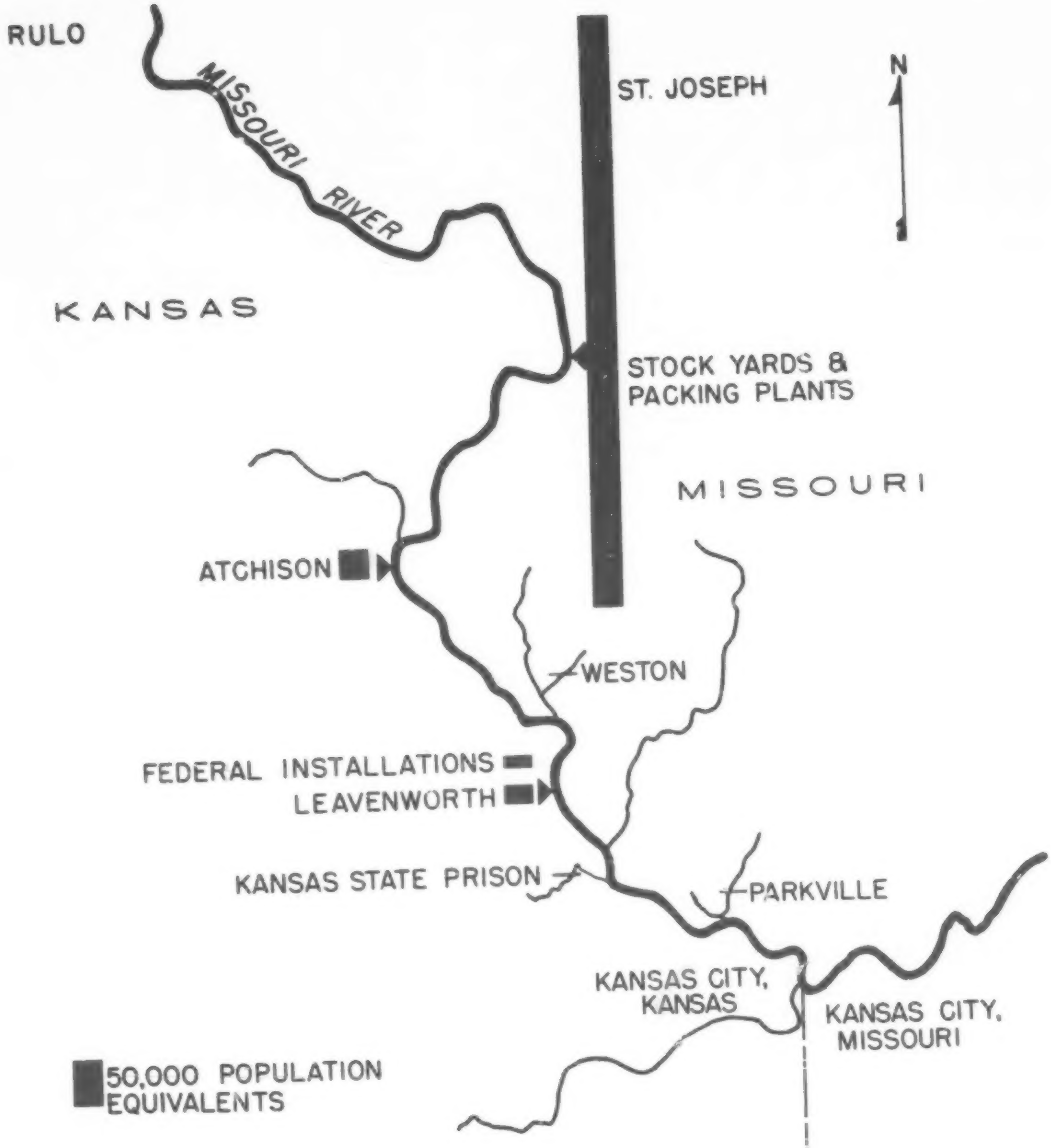
And Parkville discharges a population equivalent of 1,050 or 1/10th of 1 percent of the total.

The total from all sources in this section of the river is 713,830.

Q. Mr. Kittrell, did your study and survey indicate any other significant sources of organic pollution to this stretch of the river?

A. No.

184.A


RULO
MISSOURI RIVER
ST. JOSEPH
N
KANSAS
STOCK YARDS & PACKING PLANTS
MISSOURI
ATCHISON
WESTON
FEDERAL INSTALLATIONS
LEAVENWORTH
KANSAS STATE PRISON
PARKVILLE
KANSAS CITY, KANSAS
KANSAS CITY, MISSOURI
50,000 POPULATION EQUIVALENTS

MISSOURI RIVER
ST. JOSEPH, MISSOURI TO KANSAS CITY, KANSAS
SOURCES OF ORGANIC POLLUTION

MR. EDELMAN: I offer Government Exhibit No. 22 for identification in evidence.

MR. BROWN: I have no objection.

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: It will be received.

(Government's Exhibit No. 22 received in evidence.)

Q. (By Mr. Edelman.) As part of your official duties, Mr. Kittrell, did you direct and participate in field studies of the Missouri River in the stretch between St. Joseph, Missouri, and Kansas City, Kansas?

A. Yes, I did.

Q. When were these studies conducted?

A. Well, there were a total of three, two of which were under my immediate supervision. The first study of recent date was from January 8 through February 7, 1958. This was conducted under the supervision of our Regional Office in Kansas City. In that study we furnished a chemist working under my supervision to make bacteriological analyses, a man who had had long experience in both bacteriological and chemical analysis, and I served in an advisory capacity to the Regional Office in establishing and directing that survey.

The second survey was from September 16 through September 22, 1958, and this one was under my immediate supervision.

The third and final study started on April--let's see, I have that date here somewhere--April 20, 1959, and the major portion of the study extended through May 16--I am sorry--May 18, 1959, but during June for a period of four days we collected additional samples for special purposes.

Q. Are you familiar with the method used to conduct these studies?

A. Yes, the methods were selected by me and carried out under my supervision.

Q. Were these methods in accordance with accepted procedures in the sanitary engineering profession?

A. They were.

Q. Can you tell us in detail how you conducted the study of April 20, 1959?

A. Well, our first step was to familiarize ourselves with all recent developments in the area. We took a boat trip from--as I mentioned earlier--from St. Joseph to Kansas City, Kansas, observing sewers, the discharge of wastes from the sewers, major tributary streams, and the characteristics of the river. We selected sampling stations which we anticipated would give us the desired information on the effects of contamination on the river. We--

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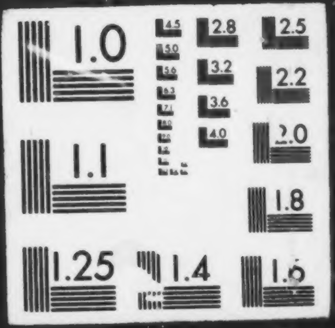
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Q. Do you have a chart showing the approximate locations of these sampling stations?

A. Yes.

MR. EDELMAN: I offer a chart entitled "St. Joseph, Missouri to Kansas City, Kansas Sampling Stations" as Government Exhibit for identification No. 23.

(Government's Exhibit No. 23 marked for identification.)

Q. (By Mr. Edelman.) Can you show us where your sampling stations were located by reference to the Government Exhibit for identification No. 23?

A. Yes. I might say that we had two different types of stations. One was stations located at each of the water plant intakes (indicating), one at St. Joseph intake (indicating), one at Atchison (indicating), one at Leavenworth (indicating), and one at the Kansas City water plant (indicating). The other stations on the main river were boat stations. In general we had one boat station at or let's say opposite or very near each of the water plant intakes and then between each of the two towns we had two additional boat stations. This gave a total of 10 sampling locations on the main river.

I noted that the boat stations and the other water intakes were not in all cases exactly opposite the water intake. At Leavenworth, for example, the water intake is at river mile 408.8, and I have shown that station plus the boat station that we considered reasonably representative of the Leavenworth intake at mile 410.

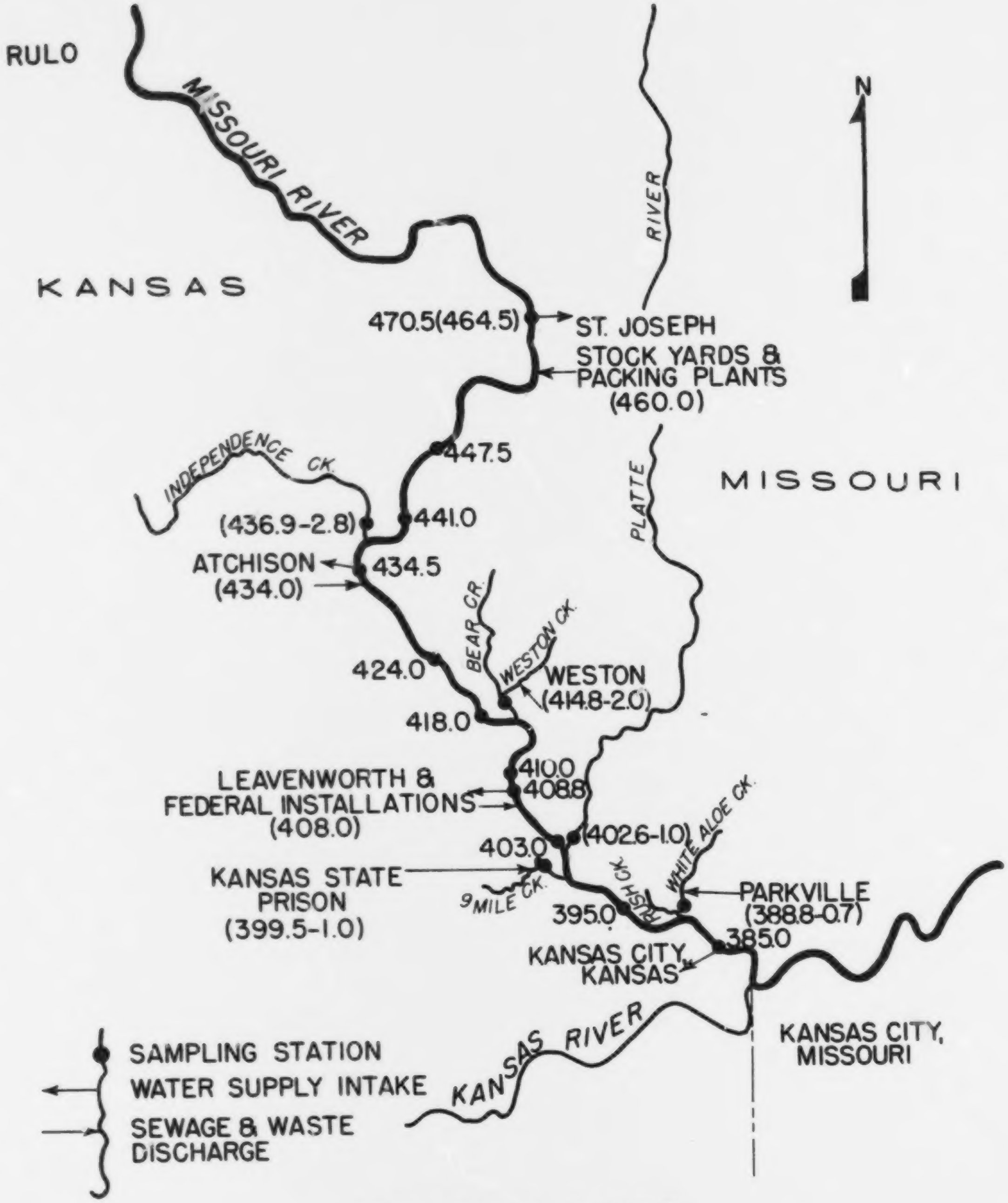
In addition to the stations on the main river we had stations on a number of tributary streams and on this chart I have shown those that I considered of major significance. I have not shown the total, which was a total of about 16 tributary streams. In general these stations were located as near the mouths of the stream as we could find feasible access points. Of these stations one was on the Independence Creek, which enters the Missouri a short distance above Atchison, one was near the mouth of the Platte River, which drains a very large portion of the total drainage area tributary to the Missouri between St. Joseph and Kansas City, Kansas, three of them are shown on the small streams receiving sewage from small towns which I have previously designated, Weston, Missouri (indicating), the Kansas State Prison (indicating), and Parkville, Missouri (indicating).

Q. Were these sampling stations used for the January 1958 and the September 1958 studies too, Mr. Kittrell?

A. Yes, these same stations were used in both cases.

Q. Will you tell us how samples were collected?

A. Yes. We had two--on the main river we had two different sampling systems, I might say. At the waterworks intakes, each of the four waterworks intakes, we sampled either from the waterworks intake itself, which was at St. Joseph, Atchison, and Kansas City, Kansas. At Leavenworth we could not find a suitable tap for sampling from the intake and it was sampled


RULO
MISSOURI RIVER
KANSAS
RIVER
N
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ST. JOSEPH
STOCK YARDS & PACKING PLANTS (460.0)
447.5
MISSOURI
INDEPENDENCE CK.
(436.9-2.8)
441.0
ATCHISON
434.5
(434.0)
PLATTE
BEAR CR.
WESTON CK.
WESTON
(414.8-2.0)
424.0
418.0
410.0
408.8
LEAVENWORTH & FEDERAL INSTALLATIONS (408.0)
403.0
(402.6-1.0)
WHITE ALOE CK.
KANSAS STATE PRISON (399.5-1.0)
9 MILE CK.
RUSH CK.
395.0
PARKVILLE (388.8-0.7)
385.0
KANSAS CITY, KANSAS
KANSAS CITY, MISSOURI
KANSAS RIVER
SAMPLING STATION
WATER SUPPLY INTAKE
SEWAGE & WASTE DISCHARGE

## MISSOURI RIVER
## ST. JOSEPH, MISSOURI TO KANSAS CITY, KANSAS
## SAMPLING STATIONS

by dropping a bottle from the platform around the intake. At these four stations we sampled around the clock at three-hour intervals for two different periods, one period of seven days and a second period of four days.

The other stations on the main river, including the intake stations or those we consider representative of the intakes, were sampled by boat and at each point we sampled at three--at each station we sampled at three points across the river, the quarter points of the river. And on the days that we took boat samples we sampled one grab sample at each sampling point each day. In making the boat runs we alternated the direction in which the boat went; in other words, one day we would start out at Kansas City, Kansas, and go up to St. Joseph; the next day we would start at St. Joseph and go down to Kansas City, Kansas, to vary the time of sample collection as much as was feasible.

On the tributaries we sampled from bridges, generally, and a single sample was taken each day we sampled the tributary from approximately the mid-channel of the tributary.

Q. What was done with the samples after they were collected?

A. They were labeled, of course, and iced immediately and then transported to our laboratory, which was established in Kansas City, Kansas, water plant for examination by our chemist. In general no sample was in transit more than a period of six hours.

Q. Were these samples analyzed?

A. They were examined by persons assigned to this study in the laboratory of the Kansas City, Kansas, water plant.

Q. Now, did the sampling, the handling of samples and the methods of laboratory examination that you used in all these surveys, comply with the standard procedures with respect to the accumulation of coliform data?

A. Very strictly, yes.

Q. What was the condition of the river during a portion of your sampling period?

A. Well, during a portion of the sampling period or I should say during several periods during the sampling period we had rather high rainfall and rather high runoff on both tributaries and the main river. This occurred both in September '58 and in April and May '59.

Q. Did the laboratory examination of the samples you took reflect this period of high flow?

A. Very definitely.

Q. Did the--

A. That is, those that were taken during such periods, yes.

Q. Did the levels shown by the samples taken during the period of high flow in your opinion reasonably reflect the effect of sewage contamination as indicated by tests for coliform organisms according to the most probable number method?

A. In relation to coliform organisms from the sources of sewage on the river I would say that during periods of high flow the most probable numbers that we obtained were higher than those that would be truly representative of sewage contamination alone.

Q. Did you then make a selection of the sampling days that you considered would yield fairly representative results with respect to sewage pollution on the main river?

A. Yes, I did. I made a very careful examination of the data, based on several different bases for judgment, and selected those days when I was confident that there was little effect of surface runoff reflected in the most probable numbers of coliform organisms that we obtained.

Q. What factors did you use in making that selection?

A. Well, one of the things I considered was the length of time following a rainfall and a rise in the river. The data indicated that in general when coliform organisms increased because of surface runoff that in three or four days following the increase the coliforms in the main river would drop to and remain at a fairly stable level.

Another basis was the fact that during such periods, that is high runoff, a great many of the MPN's on samples taken on any one day would be in excess of 100,000 per 100 milliliters and on dates on which there were numerous samples in excess of 100,000 per 100 I excluded those results.

Turbidity also was an indication of the effects of excessive surface runoff and of high coliform organisms from surface drainage and in general when turbidities were, oh, in excess of 1,000 parts per million or so, most of those dates--the results on most of those dates were excluded.

Q. What dates did you finally select as reasonably representative of the normal flow of the river?

A. Well, for the last survey, the period of April and May 1959, I found that there were four consecutive days of continuous around-the-clock sampling at the four water plant intakes, April 23rd through the 26th, when the MPN's appeared to represent normal contribution of the sources of sewage involved. In addition there were 5 days of boat sampling, April 29th, May 1st and 2nd, and May 17th and 18th, when the MPN's appeared to represent only sewage contamination from the sources along the river. In addition to that I found that there were two days during the study of September 1958, September 20th and 21st, when the coliform organisms appeared to be at a stable level.

With respect to the winter samples of 1958, January and February 1958, there did not appear to be a great deal of effect of surface runoff in the 22 sets of samples that were obtained, but there was a rather irregular flow for a certain portion of that period, a variation in river flow, and so from those 22 sets of data I selected 11 which appeared again to represent fairly stable conditions of flow and, therefore, to represent the effects of sewage contamination. These dates were January 20th and January 27th through the 31st and February 3rd through the 7th, 1958.

Q. Mr. Kittrell, were the coliform levels on the days you selected as reasonably representative higher or lower than the coliform levels on the days you rejected?

A. They were lower and in most cases they were considerably lower for the period that I--for the dates that I selected.

Q. Mr. Kittrell, did you prepare a chart which indicates the coliform levels found at your various sampling stations?

A. Yes, I have.

MR. EDELMAN: At this time I would like to offer in evidence Government Exhibit for identification No. 23.

MR. SCHOENLAUB: No objection.

MR. BROWN: No objection.

CHAIRMAN SAMSON: Exhibit 23 will be received.

(Government's Exhibit No. 23 received in evidence.)

MR. EDELMAN: And I offer for identification as Government Exhibit No. 24 a chart marked "St. Joseph, Missouri to Kansas City, Kansas Bacterial Contamination under Warm Weather Conditions".

(Government's Exhibit No. 24 marked for identification.)

MR. BROWN: 24?

MR. EDELMAN: That is identification No. 24.

Q. (By Mr. Edelman.) Mr. Kittrell, what organisms did the laboratory examination look for?

A. Well, the samples were submitted to three different methods of bacteriological examination. One of them was the usual examination for coliform organisms which is specified in Standard Methods of Water Analysis, and in the examination for these organisms our laboratory staff followed very strictly the recommendations of Standard Methods of Water Analysis--or Standard Methods for the examination of water, sewage and industrial wastes, the official publication or reference book on laboratory methods for this particular profession.

In addition we made examinations for streptococci and for fecal coliform organisms. The methods used here were those developed by Mr. Harold F. Clark of the Robert A. Taft Sanitary Engineering Center.

Q. What is the significance of coliform as an indicator organism when it is shown to exist downstream from a source of pollution, of sewage pollution?

A. Well, a great many coliform organisms originate in the intestinal tract of humans and of warm-blooded animals. This is also the source, especially with relation to humans, of pathogenic organisms. Where there are large numbers of coliform organisms the probability that pathogenic organisms also are present or will be present sooner or later is very great, and any pathogenic organisms ingested into humans can cause water-borne disease.

Q. Mr. Kittrell, now referring to Government Exhibit for identification No. 24, will you tell us what the sampling procedure you have described disclosed?

A. Yes.

Q. And will you tell us generally the scale of that chart?

A. Well, the chart is marked along the vertical axis (indicating) with dashed lines along the left margin, each of which represents an MPN of 10,000 coliform organisms per 100 milliliters. In other words, at our first upstream station above St. Joseph the average of the boat sampling data that I selected was an MPN of 34,700 coliform organisms per 100 milliliters. The results of the four days of continuous sampling at this point was in very good agreement with the boat sampling average, and the results of the intake samples, the average was 36,050.

Continuing downstream, the first station below St. Joseph yielded a coliform organism content of 57,500 per 100 milliliters. That is indicated, I should have pointed out, by the green circle on the chart (indicating). The results of the boat samples are represented by green circles. The first station below St. Joseph yielded an average of 57,500.

The next downstream station (indicating), which is still above Atchison, yielded an average MPN on the boat sampling stations of 33,000 per 100 milliliters.

CHAIRMAN SAMSON: Mr. Kittrell, may I interrupt you just a minute? What is the distance between the first boat sampling point and the second boat sampling point on the coliform--

A. You mean between this point (indicating) and this one (indicating)?

CHAIRMAN SAMSON: No, I mean that green point--

A. The one above St. Joseph?

CHAIRMAN SAMSON: --and the green point up in the middle of the chart.

A. Well, I can cite you river mileages. The St. Joseph waterworks intake is shown on the official Corps of Engineers mileage chart as being mile 470.5. However, I should point out in that connection that that mileage was established when there was a large bend in the river, which has since been cut off, and the length of that section of the stream due to cutting off this oxbow has been reduced about six miles. So in order to make my plotting of data uniform, I have actually indicated the St. Joseph intake at mile 464.5. So the first station is, then, for the purpose of plotting, at mile 464.5.

The next station downstream, the first one below St. Joseph, is 447.5 or a distance below the St. Joseph intake of about 17 miles.

CHAIRMAN SAMSON: That answers my question. Thank you, Doctor.

A. Would you like the same information on the other stations?

CHAIRMAN SAMSON: You proceed with your regulat examination, thank you.

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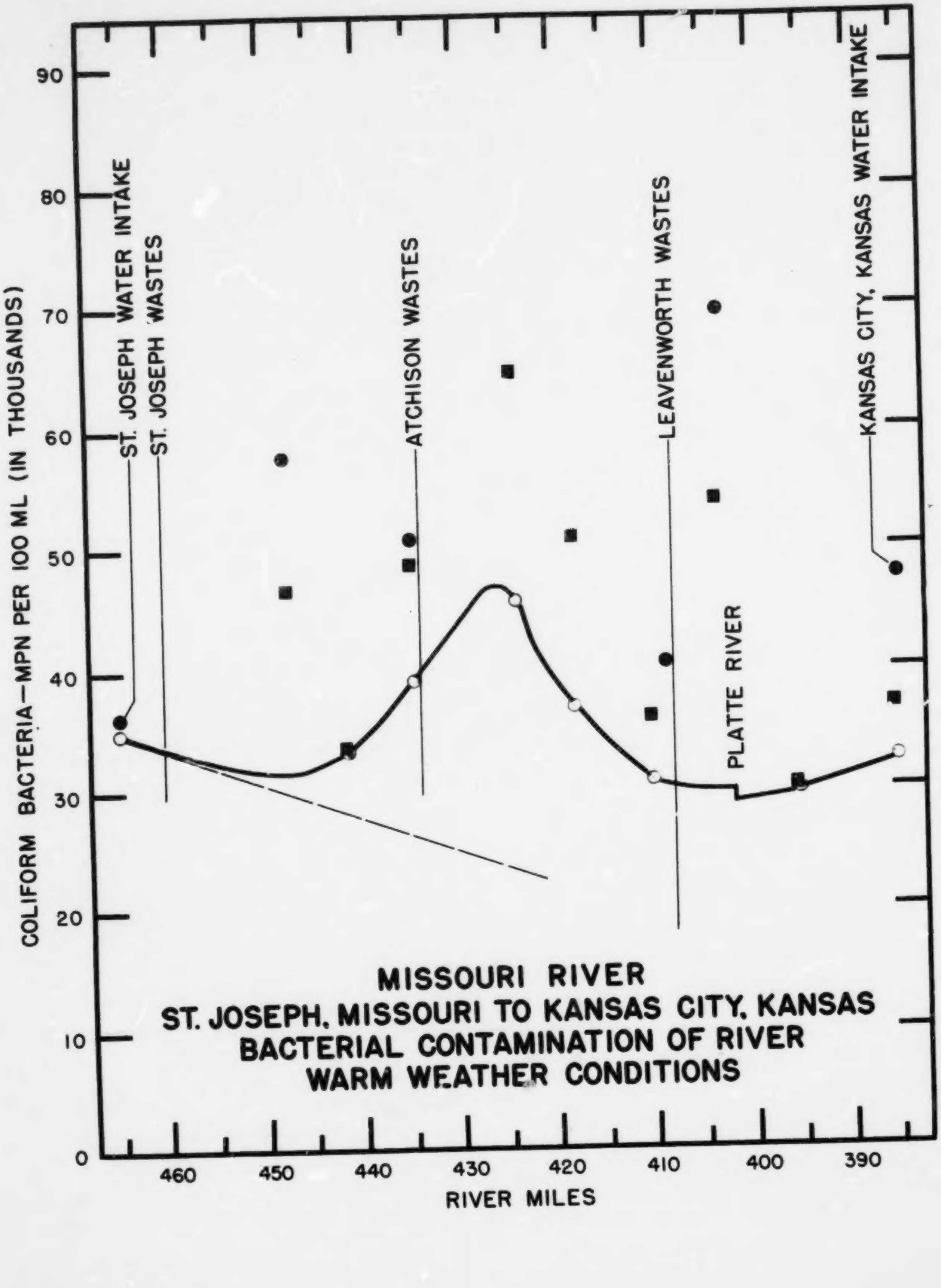

MISSOURI RIVER
ST. JOSEPH, MISSOURI TO KANSAS CITY, KANSAS
BACTERIAL CONTAMINATION OF RIVER
WARM WEATHER CONDITIONS

A. Well, the next station downstream, the boat station which was at approximately the location of the water plant intake, yielded an average coliform MPN of 39,000 per 100 milliliters. The average of the water plant intake samples, however, was 50,900.

The first station below Atchison, the boat samples yielded an average of 45,600 per 100 milliliters.

The next boat station below Atchison an average of 36,600.

And the boat station just above Leavenworth yielded an average of 31,100. However, the continuous around-the-clock sampling for four days at Leavenworth yielded an average of 40,400.

The first station below Leavenworth yielded an average of 69,300.

The second station below an average of 29,800.

And the boat station at the Kansas City, Kansas, waterwork intake an average of 32,100, compared to the average for the around-the-clock samples of 47,900.

Q. (By Mr. Edelman.) Mr. Kittrell, from your statement of the mileage used on this chart, your boat stations were pretty close together, weren't they?

A. Yes, in terms of mileage they were, oh, roughly 6 or 7 miles apart, something like this, on the average, I would say.

Q. And the communities involved here are also pretty close together, aren't they?

A. That is right, they run an average of about 25 miles apart from one source of waste to the next downstream source or to the next downstream water intake.

Q. Now, on the chart that is Government Exhibit for Identification No. 24, you have connected the boat sample results by a red line, is that correct?

A. That is correct.

Q. Beginning at St. Joseph there is a dotted line that projects downward?

A. Yes.

Q. Will you tell me what that dotted line represents?

A. Well, this (indicating) is a projection of the MPN of coliform organisms found at the St. Joseph intake downstream below St. Joseph in terms of the continuing death rate of coliform organisms that might be anticipated in the absence of the addition of contamination from St. Joseph and Atchison.

Q. In other words, there are coliform in the river above St. Joseph?

A. That is correct.

Q. And that dotted line, as I understand it, indicates where the coliform level would be if St. Joseph contributed no pollution whatsoever to the river?

A. That is correct.

Q. Those square little rectangles, those little rectangles, represent results at the water plant intakes, do they not?

A. No, the round--

Q. The round black?

A. The black circles represent the water plant results, the four day continuous sampling.

Q. As you go down river, the one at St. Joseph is in close proximity to the boat sample values?

A. That is correct.

Q. But as you go downstream the boat sample values are much lower than those for the water plant intakes, is that correct?

A. That is correct.

Q. Do you consider that the boat sample values fairly reflect the average daily coliform levels found in that stretch of the river?

A. In general I do not.

Q. Do you think that the values indicated at the water plant intakes are a better reflection?

A. I think they are a very much better reflection of the average daily levels of coliform contaminations.

Q. Do you have any explanation for the difference in values between your boat samples and the water plant intake samples?

A. Yes, I do. On examination of the times at which the boat samples were taken and computing the average time from the boat sampling station back up to the next upstream source of sewage, it became apparent that a great many of our boat samples were collected at such a time that they contained sewage which had left the upstream source of contamination at a time when the strength of the sewage was very low in relation to the average daily strength of the sewage.

Q. Is there an accepted figure for determining the average daily strength of sewage, Mr. Kittrell, indicating whether the sewage is stronger at certain times of the day than at others?

A. Yes, there is. There is a chart showing--or table, rather, I should say, in Metcalf and Eddy, Waste Disposal, Volume III, which is a standard book in the sanitary engineering profession on treatment of sewage and characteristics of sewage, and this table does show the variations in strength of sewage throughout a 24-hour period.

Q. Now, by using this variation in the strength of sewage as a basis, is it possible to interpret your boat samples so that you can with reasonable certainty compute what you consider to be a more accurate average daily coliform level in this stretch of the river?

A. Yes, I think a much better--a much more nearly representative average of daily additions can be obtained in this way.

Q. Did you make that computation?

A. Yes, I did.

Q. Did you prepare a chart on that subject?

A. Yes, I have such a chart.

MR. EDELMAN: I offer this chart marked "Bacterial Contamination of River Warm Weather Conditions" as Government Exhibit for Identification No. 25.

(Government's Exhibit No. 25 marked for identification.)

MR. BROWN: How did you label that chart?

MR. EDELMAN: I read the title. I guess the title is the same as the earlier one. Let's see, is there any other distinguishing title on here?

This differs from the earlier chart in that there are several--lines of several colors on it. Is that adequate?

MR. BROWN: What is the difference in the terminology?

MR. EDELMAN: Government Exhibit 25 for identification also shows at the bottom of the chart "Objectives: Water Supply and General Recreation" and "Swimming".

Q. (By Mr. Edelman.) Referring to Government Exhibit No. 25 for identification, Mr. Kittrell, will you show us where the adjusted values fall on that chart?

A. Yes. On this chart I have omitted the boat sampling station results as found and instead have substituted the adjusted values for the boat sampling stations which are shown by the solid black squares (indicating). I have retained on this chart the averages at the four water plant intakes (indicating).

On this chart, then, the average at the St. Joseph water plant intake was 36,050, the next downstream station, the adjusted value, 46,700, at the second downstream station the adjusted value was 33,400, the adjusted boat sampling value opposite the Atchison water plant intake was 48,400, which is in very good agreement with the water plant intake average of 50,900. The first station below Atchison, the adjusted value is 64,300. The second value below Atchison, the adjusted value is 50,900, and the adjusted value near the Leavenworth waterwork intake is 35,500, compared to the water plant intake of 40,400.

The first station below Leavenworth, the adjusted average is 53,800. The second station, the adjusted average is 29,800. And at the boat station opposite the Kansas City, Kansas, waterworks intake the adjusted average is 36,100.

Q. Now, apart from the closer correspondence of your boat samples to the intake samples, do these adjusted values give any other corroboration to your opinion that they more nearly represent the average daily coliform level?

A. Yes.

Q. Will you tell us what they are?

A. Well, on this chart also I have shown the same projection of the death rate of coliform organisms from above St. Joseph, which would occur in the absence of added pollution from St. Joseph and Atchison. At the point on the river which is mile 424 where the peak of the curve occurs, according to the data that I have used, the difference between the residual coliforms from upstream and those found is within 5 percent of the value that would be expected in terms of the contamination added by St. Joseph and the stockyards and by Atchison, which is a very good check on the added contamination, it checks within 5 percent of the anticipated value.

Q. Beginning at Atchison, you have a red line and what from this distance looks like a black dotted line?

A. (Indicating.)

Q. Yes, that line. Would you tell us what that black dotted line represents?

A. Well, the red line (indicating) is or represents the total MPN of the river. That line shows a reasonably normal death rate following the peak of the curve down to Leavenworth. I have compared that rate with the rate found--rates found in other streams and it is in reasonable agreement with the death rates found in other streams.

The black curve was obtained by subtracting at the peak of the curve below Atchison the computed contribution by Atchison's sewage, which in this case was an MPN of 6,300 per 100 milliliters added to the peak by Atchison. The continuation of that curve is parallel to the basic curve on semilogarithmic paper and this is shown to represent the MPN of the river in the absence of contamination from Atchison. In other words, this (indicating) represents the computed course of bacterial contamination, computed reduction of bacterial contamination, from St. Joseph and from upstream above St. Joseph.

Q. Can you tell us to what extent pollution from tributaries is reflected in these coliform levels?

A. Well, one indication is on this curve right below Leavenworth (indicating) where I have shown the entrance of the Platte River. We sampled the Platte River about 20 times during the survey and using data for the coli contribution, coliform contribution of the Platte River, flow in the Platte on the days that we used the data on the main river, I computed that the lower coliform concentration of the Platte River on those days when added to the more highly contaminated water of the Missouri River at that point

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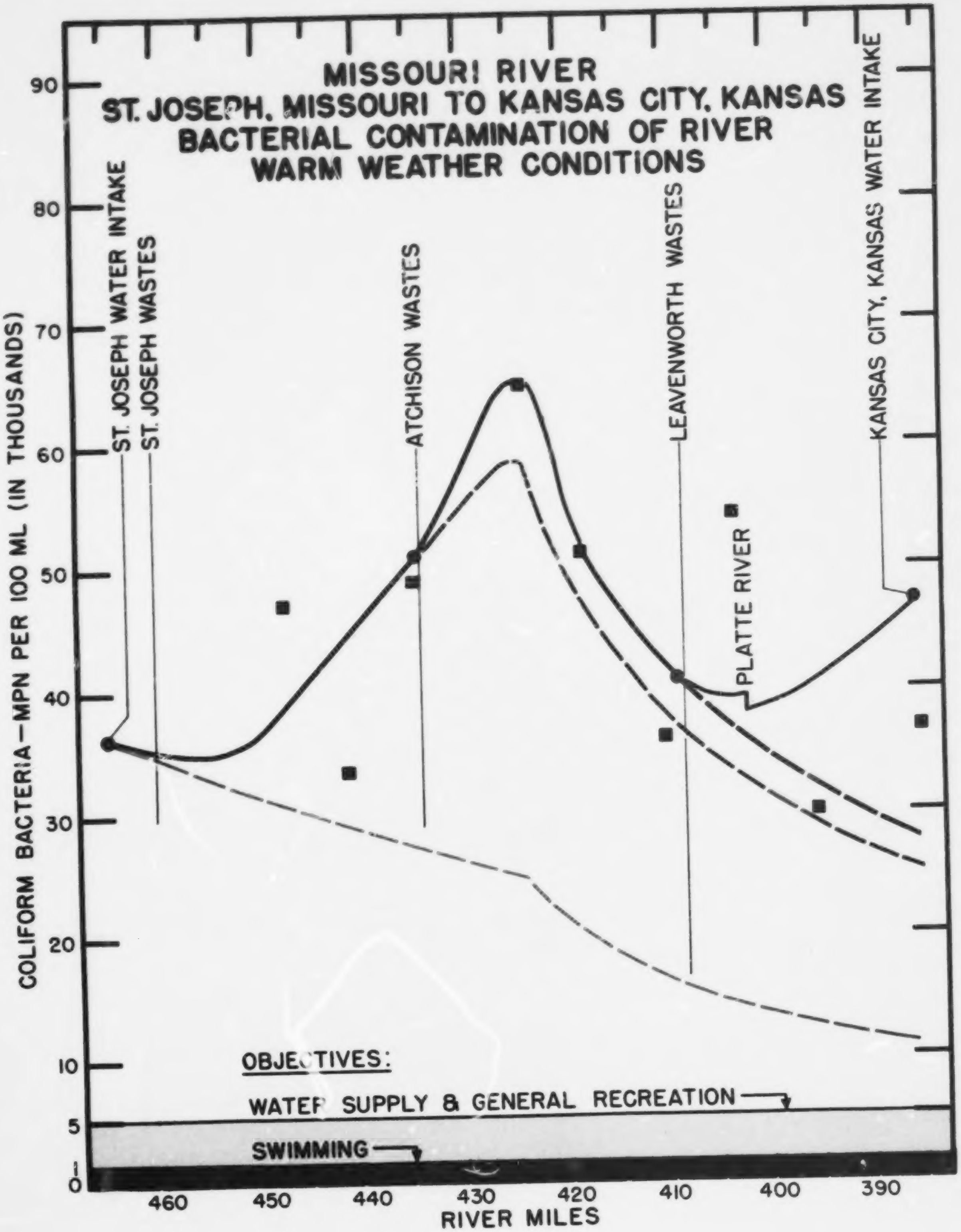
MISSOURI RIVER
ST. JOSEPH, MISSOURI TO KANSAS CITY, KANSAS
BACTERIAL CONTAMINATION OF RIVER
WARM WEATHER CONDITIONS
COLIFORM BACTERIA—MPN PER 100 ML (IN THOUSANDS)
90
80
70
60
50
40
30
20
10
5
1
0
ST. JOSEPH WATER INTAKE
ST. JOSEPH WASTES
ATCHISON WASTES
LEAVENWORTH WASTES
PLATTE RIVER
KANSAS CITY, KANSAS WATER INTAKE
OBJECTIVES:
WATER SUPPLY & GENERAL RECREATION
SWIMMING
460
450
440
430
420
410
400
390
RIVER MILES

would actually reduce the coliform organisms in the Missouri by dilution. This reduction amounted to some 1,300, an MPN of 1,300, per milliliter in the Missouri itself.

Q. Do you know what portion of the area drained by tributaries which enter the Missouri River in this stretch is drained by the Platte River?

A. Yes.

Q. Will you tell us what that percentage is?

A. The total drainage area of the Platte River is 2,440 miles. The total drainage area tributary to the Missouri River between St. Joseph and the Kansas City, Kansas, water plant intake is 2,900 and--I am sorry--2,938 miles.

Would you read that back? I am not sure I got the right figures there, please.

(Answer read.)

A. That is correct.

Q. (By Mr. Edelman.) Is it total area?

A. The area of the Platte River represents--or drained by the Platte River represents 27.4 percent of the total drainage area tributary to this section of the Missouri River.

CHAIRMAN SAMSON: What is that percent?

A. 72.4.

CHAIRMAN SAMSON: Thank you.

Q. (By Mr. Edelman.) Did I understand you to say that the total area drained by tributaries in this stretch of the Missouri River is approximately 2,900 square miles?

A. 2,938, yes.

Q. What other tributaries are involved in this area that you sampled?

A. Well, we sampled, as I pointed out on an earlier chart, we sampled Independence Creek, which flows into the Missouri River just above Atchison and this represents a drainage area of 162 square miles or 5 percent of the total.

Q. What contribution did that make to coliform contamination?

A. That also had a somewhat lower coliform concentration than the main river and again figuring the effects of dilution of this cleaner water on the Missouri it would have reduced the MPN of the Missouri at that point by an MPN of about 80 per 100 milliliters.

Q. What percentage of the total drainage area of this basin was represented by tributaries that you sampled?

A. All told we sampled 6 tributaries which represented a total of 87.2 percent of the entire tributary drainage area.

Q. Did you find that these tributaries made any significant contribution to the level of bacterial contamination on the day selected for use and represented on these charts?

A. No.

Q. Mr. Kittrell, are you familiar with the water quality objectives of the Public Health Service Manual of Recommended Water-Sanitation Practices?

A. I am in so far as they relate to coliform bacteria as a source of water supply.

CHAIRMAN SAMSON: Pardon me, gentlemen. The hour of 5:30 has been reached and it is a little late. I wonder if it might not be well to adjourn at this point?

MR. STEIN: We have no objection.

CHAIRMAN SAMSON: Is that agreeable with you gentlemen?

MR. BROWN: What time?

CHAIRMAN SAMSON: Well, could we start about a quarter of 9 in the morning?

MR. BROWN: Sure. Sure.

CHAIRMAN SAMSON: Is that agreeable with you gentlemen, at a quarter of 9, 8:45 in the morning?

MR. EDELMAN: May we just have a moment, Mr. Chairman?

CHAIRMAN SAMSON: Surely.

MR. EDELMAN: Mr. Chairman, as I recall, this morning you indicated there was going to be an adjournment tomorrow of several hours?

CHAIRMAN SAMSON: At 9:40 to about 11 o'clock.

MR. BROWN: I don't think it will be quite that long. I have to go to a funeral.

MR. STEIN: Yes, we understand that.

MR. EDELMAN: We are just trying to figure out our schedule, Mr. Brown.

MR. BROWN: Yes.

MR. STEIN: In other words, we would be in session for about an hour before we adjourn?

CHAIRMAN SAMSON: That is approximately right. There is nothing arbitrary about that. We will work out any problem that we have.

MR. STEIN: That is perfectly agreeable.

MR. EDELMAN: Yes. We have no objection to interrupting Mr. Kittrell at this point, Mr. Chairman.

CHAIRMAN SAMSON: Is it agreeable, then, that we adjourn now and go to labor in the morning at 8:45?

MR. BROWN: Yes, sir.

CHAIRMAN SAMSON: We will stand adjourned then.

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WHEREUPON, the hearing was adjourned until 8:45 o'clock a. m. of the following day, at which time the following further proceedings were had and entered of record, to wit:

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## MORNING SESSION, WEDNESDAY, JULY 29, 1959

CHAIRMAN SAMSON: The hearing will come to order and you may proceed.

Pursuant to the announcement yesterday we will adjourn this morning at 9:40 for a period of about up to 11 o'clock. Thank you.

MR. EDELMAN: Mr. Chairman, at this time the Government has a request to make. In view of the deferment that has been scheduled we face a problem with the scheduling of our witnesses. We would like permission to withdraw Mr. Kittrell temporarily for the purpose of presenting a number of witnesses who have commitments which would prohibit their being held over.

CHAIRMAN SAMSON: Any remarks by counsel?

MR. BROWN: We have no objection whatsoever.

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: Very well. You may proceed, then.

MR. STEIN: Mr. Weatherford.

He has not been sworn.

MR. AYERS: Do you have any more to swear at this time?

MR. STEIN: Not at this time.

(Witness sworn.)

ALBERT E. WEATHERFORD,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

### DIRECT EXAMINATION

BY MR. STEIN:

Q. Mr. Weatherford, will you state your name and home address for the Board?

A. Yes, sir. Albert E. Weatherford, 916 Laramie, Atchison, Kansas.

Q. By whom are you employed, Mr. Weatherford?

A. By the Atchison City Waterworks at Atchison, Kansas.

Q. What is your position there?

A. Chief operator.

Q. How long have you worked in this water plant?

A. Twenty-seven years.

Q. Can you very briefly describe what the Atchison Water Plant does to treat water?

A. Yes. We have plain sedimentation, coagulation, chlorination, application of activated carbon, settling filtration, prechlorination and post-chlorination.

Q. Where do you get your source of raw water supply?

A. From the Missouri River.

Q. How do you control the safety of your water?

A. By extensive treatment with chlorine, coagulation.

Q. Do you ever take samples for bacterial examination?

A. Samples are submitted weekly to the Kansas State Board of Health for bacteriological analysis.

Q. Where do you get these samples?

A. They are collected from the distribution system and also from the raw water itself.

Q. Have you ever experienced taste and odor problems?

A. They have been quite prevalent, sir.

Q. Will you describe your experience with them?

A. Yes. Those tastes and odors, I may describe them as a character which are medicinal, septic, sewage, musty and moldy. They have no respect with flow and they appear at varying intervals. They may appear any time of the day or any time of the night. Their duration may last from an hour to four hours to eight hours and sometimes up to three weeks.

Q. Do you find that these taste and odor problems occur when you have high runoff, low flow, or do they occur at any stated time?

A. It doesn't make too much difference. Possibly the worst offenders we have are with the spring runoff and the high discharge due to melting snow and tributary runoff from the surrounding agricultural districts. A certain amount of that may be attributed to those odors from agriculture. I think the majority of those odors are absolutely caused and definitely caused by industrial discharge and by sewage.

MR. SCHOENLAUB: Your Honor, we object to his conclusions unless he has a proper base on which they are made.

CHAIRMAN SAMSON: I wonder, counsel, if you can develop the foundation just a little further on his last answer.

Q. (By Mr. Stein.) Would you indicate how you analyze taste and odor problems?

A. The taste and odor problems are made with the same determination as of the Tenth Edition Standard Methods.

Q. Do you want to describe that briefly?

A. Yes. There are two techniques. One, the threshold odor which comprises the panel, I think we discussed that yesterday, and it isn't used too much in the smaller plants where you have limited personnel. However, there have been occasions where I have selected a panel of the neighborhood ladies and they have very sharp noses and they can easily discern tastes and odors. Those threshold odors are determined in that manner. For convenience I use the milder form, which is a qualitative form, and describe the odor number and the odor--I mean the odor intensity and the odor character.

Q. Do you ever have odors coming down in slugs in a relatively short duration?

A. Those are the odors that I attribute to the industrial and domestic discharge from the outfalls of St. Joe.

MR. SCHOENLAUB: Your Honor, there again, until he establishes where those odors come from, I object to any testimony concerning his conclusions.

A. Well, septic and sewage odor certainly when they appear in slugs aren't a result of tributary runoff, periods of low flow where you have relatively small discharge from your tributary streams.

CHAIRMAN SAMSON: Permit me to ask a question on this foundation.

A. Yes, sir.

CHAIRMAN SAMSON: Have you personally observed this condition yourself?

A. I have personally observed it. These odors are a result of my direct analysis.

CHAIRMAN SAMSON: Direct examination that you have been engaged in?

A. That is right, sir.

CHAIRMAN SAMSON: The objection is overruled.

Q. (By Mr. Stein.) How is the chlorine demand of your plant?

A. The chlorine demand is extremely variable; it is a very tricky proposition. We can establish a normal application of chlorine and during the night or maybe during the daytime we will have a slug of that stuff come down and we have to adjust the whole thing and resort to analytical procedures to determine the proper amount of chlorine and it is very tricky.

Q. What do you mean by "that stuff"?

A. Sir?

Q. What do you mean by "that stuff"?

A. By "that stuff" I mean slugs from possibly pollution from the industry and from domestic sewage.

Q. Up to what quantities of chlorine do you use?

A. Well, we superseded our capacity by several parts per million. We have a normal capacity of 16 parts per million chlorine, which should be adequate for a river such as the Missouri River. And there have been times when we have gone--

CHAIRMAN SAMSON: Mr. Weatherford, you are talking right there with your hand alongside your face and we can't hear you. Thank you.

A. I am sorry. We have a capacity of 16 parts per million, which should be more than adequate to treat any stream the size of the Missouri River. That is, a river without--that isn't highly polluted. However, there have been times when this has been insufficient, quite insufficient, and we resorted to a system of chlorination. We recognized the necessity of a different type chlorination as early as 1933--or 1943, sir, and we installed another system and purchased new chlorinators to take care of this contingency and they were adequate at that time. We produced free residual chlorination, which is an excellent germicide and does remove tastes and odors, and that is the reason I have to make that statement about the type chlorination that we are receiving, that we are instituting.

Q. (By Mr. Stein.) Do you ever have to put more than 16 parts of chlorine in?

A. Yes, we did on March 1st this year; the chlorine demand went up to over 20 parts per million. Since the capacity of our machines was only 16 parts per million it was quite necessary to hook up a bunch of chlorine cylinders, connect them to a manifold and apply molecular chlorine directly into our flash mix basin to satisfy that demand. Unless the demand of that water is satisfied, unless the organic demand is satisfied, then you can't successfully kill off pathogenic bacteria or destroy the indicator organism, the coliform organism. It does require free residual chlorination on this Missouri River.

Q. Mr. Weatherford, would you consider that hookup that you have had as emergency treatment, an emergency measure?

A. It was quite, quite an emergency treatment. I don't think I care to go into that factor any more because it is dangerous. It is dangerous to work around. And another thing I might bring to the attention at this time, even with increased dosage and extremely high dosages of chlorine, in order to produce hypochloric acid we have to lower the pH of that water to get a certain percentage of hypochloric acid. There is an extreme danger of producing nitrogen trichloride, which is a very odoriferous compound. It is highly unstable and it is difficult at times to remove from your system. As a consequence, we do develop chlorinous tastes in our distribution system, as a result, possibly, of nitrogen trichloride and chlororganic compounds.

Q. Mr. Weatherford, I think the Board would appreciate it if you, while I am asking you questions, would direct your remarks to them.

A. Surely.

Q. Have you had any problems with your coagulation methods at the plant?

A. Coagulation methods on the Missouri are usually difficult, but more so, I think, at our location, and I can attribute these difficulties to the syndets or synthetic detergents or the surfactants. They reduce the surface tension and they tend to dissipate while we are tending to bring together to coagulate. It does influence coagulation and many times our precipitate, which is a gelatinous precipitate of aluminum hydroxide, tends to float rather than settle by the force of gravitation. It brings the stuff up and disburses it. As a consequence we do have turbidity over our filters which we shouldn't have even with the extensive treatment and high coagulation doses. It isn't favorable to any filter or any water supply.

CHAIRMAN SAMSON: Mr. Weatherford, with this highly technical testimony, if you could just slow up just a little bit, why, we would appreciate it.

A. All right, sir.

Q. (By Mr. Stein.) Mr. Weatherford, have you ever experienced any problems with nitrogen compounds?

A. Yes. The nitrogen compounds have been accepted as a criterion for pollution and they have been relatively high. In fact the free ammonia content is always high. I think the standard high would be one-tenth of a part per million and we even encountered more than 10 times this amount in our water supply. The organic fraction has also been extremely high.

CHAIRMAN SAMSON: Question.

MR. POOLE: Question. You mean you have had free ammonia parts per million?

A. Free ammonia and parts per million or milligrams per liter.

MR. POOLE: As much as a part per million you are saying?

A. All right, let's say parts per million for clarity.

MR. POOLE: No, my question is how many parts per million of free ammonia?

A. I have checked it as high as 1.4, 1.2. I don't commit all those data to memory. It has been high.

Q. (By Mr. Stein.) Did you cover free ammonia or organic nitrogen?

A. Both.

Q. Mr. Weatherford, do you use the rapid sand filter?

A. We use the rapid sand filters, yes, sir.

Q. What do you describe as the containers that contain this water above the rapid sand filters?

A. How was that?

Q. What do you call these areas that the water is--

A. Those are filters--classed as filter bays.

Q. Filter bays?

A. Yes.

Q. That is right in the water plant?

A. That is housed in the water structure.

Q. Will you describe some of the materials you have seen from time to time in those filter bays?

A. Well, the presence of ladies precludes some of the things that I have seen. However, I will leave it to your imagination. They were floating substances. We have been troubled a great deal with fat, animal fat in particular, fat and grease and animal hair. As early as 1943 I had correspondence with the Kansas State Board of Health regarding this matter, which at that time it was substantiated as chicken feathers and tallow used in the processing of poultry. But in the later years the contamination has more or less resembled partially, you might say, partially saponified fat and animal hair imbedded in this fat. It has become quite extensive and I requested the State Board of Health to do an analysis for me and the analysis was completed and I received word from Howard Stoltenberg, the Chief Chemist, that the ingredient was principally animal fat. It was necessary on several occasions to empty those filters two or three times a day to let that flotation go back into the river. I had no means of disposing of it. In conjunction with that it required extensive scrubbing with strong detergent, washing with hydrochloric acid and flushing it, and it did cause us quite a bit of trouble. That fat and grease did not only cause that inconvenience, but it also caused a very rancid odor in our filter plant proper. We had to turn on our exhaust fans and use Aerosol sprays to combat that odor. And it wasn't very conducive to visitors coming into the plant to get a whiff of that stuff.

MR. POOLE: About when was this experience, recently? You start with 1943 here and that is quite a span of years.

A. That is quite a span of years.

MR. POOLE: Well, are you--is this that you have just described something that has happened within the past year or the past two years?

A. Within the past year. The worst contamination we found was in 1957 or 1958 during the month of March, is when I submitted the samples to the State Board of Health; and we encountered them last month, we had a terrible slug.

Now, those particles vary from a quarter of an inch in diameter to one inch in diameter, and at times we have very small particles that practically are immeasurable.

Q. (By Mr. Stein.) Mr. Weatherford, when you empty these filter basins for cleaning, do you notice any odor, characteristic odor?

A. The odor characteristics are that of being rancid.

Q. Just rancid?

A. Just rancid.

Q. Is that the usual--

A. Oh, I misunderstood you. Did you say the basins?

Q. The basins.

A. The basins, yes, those basins do have a terrific odor of septic sewage, partially digested sewage, and the men do not like to go down into those basins to clean them.

Q. Mr. Weatherford, we have had testimony here before by Dr. Walton talking about the general operations of water plants and he has stated that these plants depend on men and machines that in dealing with highly polluted water there is a danger of a failure of men and machines.

A. That is--

Q. Have you ever had any such incident?

A. I did, sir, on March 6th. We were treating very difficult water, high in odor, difficult coagulation, and extremely high chlorine doses. I utilized both prechlorinators; I was chlorinating at practically peak capacity. Since I was off duty during the night I left written and verbal orders that should the chlorine residual over our filters go above 1-1/2 parts per million that the small chlorinator should be shut down. I didn't want to get any chlorinous tastes and odors out into that distribution system. When I came to work the next morning I found out that the man--it was just a human error, he is a very good man, he has been trustworthy and he made one mistake--had shut down the wrong chlorinator. As a consequence, I came to work, I had combined chlorine going out into the distribution system and through my filters. I immediately collected a sample from the distribution system and, gentlemen, I have that sample report on hand.

Q. To whom did you send that sample?

A. These samples were sent in bottles secured from the State Board of Health of Kansas.

Q. These samples, as I understand you, were taken in the distribution system beyond your plant?

A. Beyond my plant.

Q. In other words, they would go directly to the tap?

A. They would go directly to the tap.

Q. Did you get a report from the Board of Health?

A. I have a report here that we had a coliform density or an MPN of--

MR. SCHOENLAUB: Your Honor, again I object to any testimony regarding the results of these samples by anyone other than the personnel who conducted the tests.

A. This personnel, our personnel--

CHAIRMAN SAMSON: For the evidentiary value that this report has the Board will receive it. We will keep in mind your objection, counsel.

A. Thank you, sir. As I previously quoted, we had an MPN or the most probable number or coliform density, if you wish to call it such, of 2.2, which is a little bit above the accepted standards of the Treasury Department. And I have "unsafe" marked on both of those samples in our distribution system in spite of the amount of combined chlorine that was going into the system. It is recorded at the bottom of this report from the Kansas State Board of Health that "The samples collected at 401 North 4th and Maur Hill were found to be contaminated and the water must be reported as unsafe for drinking." That is the report. I offer it to anyone that cares to look at it.

CHAIRMAN SAMSON: Possibly counsel would like to have that identified as an exhibit and pass it over to the counsel for their examination.

MR. STEIN: May we have this marked as Government Exhibit No. 26 for purposes of identification.

(Government Exhibit No. 26 marked for identification.)

Q. (By Mr. Stein.) Mr. Weatherford, does the Kansas State Board of Health do all your bacterial work?

A. They do all my bacteriological work.

Q. How do you get the results of that routinely in the ordinary course of your business, the reports?

A. We submit those samples and they are returned to us in a written report, carbon copies to the operator, to the superintendent and to the City Manager of Atchison, Kansas.

CHAIRMAN SAMSON: What year? March 6, I believe.

A. I think that was the date on there. Will you please check that for me?

MR. BROWN: March 11, 1959.

A. That was the date of completion of analysis. The date collected was, I think, March 6, was it not?

MR. STEIN: Yes.

A. Yes, sir. Thank you.

MR. BROWN: Of course technically it is not competent since it is a report from somebody else. I think it should be admitted subject to an objection of that kind for such weight as you deem it should be entitled.

CHAIRMAN SAMSON: Yes, thank you, counsel. It will be received subject to your objection.

(Government's Exhibit No. 26 received in evidence.)

CHAIRMAN SAMSON: You may proceed, Mr. Stein.

MR. STEIN: We have no other questions.

CHAIRMAN SAMSON: You may cross-examine.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Weatherford, you have stated that the worst offenders were in the spring months with a high runoff, is that not correct?

A. Those intensities were really high during the runoff. They are partially due to organic compounds, I will freely admit, of natural origin, partially only.

Q. And that at least on two occasions, 1957 and 1958, March was the month in which the worst offenders made their appearance, is that not correct?

A. May I have recourse to literature here? I don't commit those things to memory. I have these odors marked on the date that they occured that were taken from my record book. May I submit them?

Q. You stated in your direct testimony, in answer to a question by one of the Board members, that you had to use sprays and exhaust fans in order to rid your plant of the odors and that that was during March of 1957 and last month, was that not correct?

A. Did I mention last month?

Q. Yes.

MR. EDELMAN: Mr. Chairman, I think the witness's testimony was that he had grease in the filter bays last month, but the condition that he described with the chlorinator was earlier.

A. That was previous to that and it did produce such a rancid odor that I did use an Aerosol room sweetener in there.

Q. (By Mr. Schoenlaub.) That was, for the most part, during the months of March of 1957 and 1958?

A. I think that is right, sir.

Q. Again on March 1st you had to add over 16 parts per million?

A. I had to add over 20 parts per million.

Q. Over 20 parts per million?

A. Chlorine.

Q. Again in March of the year?

A. Sir?

Q. Again that was during the month of March?

A. Again that was during the month of March. But there have been other instances where it has gone up above our plant chlorinating capacity, regardless of the spring flow.

Q. What is the basic weather in this part of the country and through the Missouri Valley during the months of February and March?

A. Well, usually the month of February is fairly cold and very little rainfall.

Q. But considerable thawing?

A. Usually around in March we encounter our spring thaws, if that is what you mean.

Q. And your high periods of runoff from the--

A. High periods of runoff.

Q. --agricultural areas?

A. Yes, sir.

Q. You have lived in Atchison for 27 years?

A. I have lived there all my life, sir.

Q. Where does your city dump their sewage?

A. Into the river.

Q. Do you think that it has the same effect on water plants downstream?

A. It certainly isn't improving water conditions. We are aware of that. We have also made arrangements for a sewage disposal plant.

MR. SCHOENLAUB: I believe that is all.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Weatherford.

A. Yes, sir.

Q. There is nothing secretive about the operations of your plant or the figures or anything like that, is there?

A. No.

Q. It is a public plant?

A. Public plant.

Q. And you have discussed all this testimony previously with counsel for the Government agency?

A. I have had a limited discussion with them.

Q. Oh, you have talked to them several times?

A. Oh, I have talked to the Public Health officials when they came down.

Q. On July 22nd of this year Mr. Joel Bennett and Mr. William Minger--

A. Yes, sir.

Q. --of the Stock Yards Company came down to talk to you?

A. I am aware of it.

Q. And you were very courteous to them and they explained they simply wanted to know the true conditions?

A. That is right.

Q. That is correct, isn't it?

A. That is right, sir.

Q. And you told them that the Public Health Service had forbidden you to give them any information whatsoever?

A. No, sir, I absolutely did not.

Q. What did you tell them?

A. I told them that I could not offer any information until after the pollution hearing at St. Joe, Missouri, and after that they were welcome to go through the books or anything else.

Q. Didn't you say that you were going to be testifying in the hearing and that you had strict--

A. I didn't mention that I was going to be testifying, sir.

Q. Didn't you?

A. I did not.

Q. Didn't you say you had strict orders from the Public Health Service to give no one information concerning the pollution situation?

A. I did not. I made the remark that if I were to pass on this information I would incur the displeasure of the Public Health Service and the Kansas State Board of Health.

Q. You said if you did give the information you would incur their displeasure?

A. I did.

Q. So you gave no information?

A. I gave no information.

Q. Had you been told to keep that information in confidence?

A. No, sir.

Q. What made you think they would be displeased if you gave out a matter of public information?

A. I don't know, sir.

Q. Where did you get that idea?

A. I didn't think it was compatible with the hearings what I had at Atchison, Kansas.

Q. Do you think these hearings should be one-sided where one side keeps from the other side information?

A. No, absolutely not.

Q. But you thought it was unfair to give it?

A. I thought it was unfair in light of the circumstances.

Q. I see. Getting back to your situation down there, it is a fact, and you know it quite well, that your runoff from your agriculture district causes a part of your trouble?

A. That is right.

Q. And what percentage you can't say in percentage figures?

A. What percentage I don't know.

Q. And whether this city and the industries clean up their part of the river or not, you are still going to have pollution troubles?

A. We are still going to have water pollution troubles.

Q. And you are still going to have odor troubles?

A. We are still going to have limited odor troubles.

Q. And you are still going to have taste troubles?

A. We may.

Q. Now, at this particular time when you had this human failure down there, error--

A. Yes, sir.

Q. --you didn't get any water-borne sickness in the city of Atchison, did you?

A. I am not a physician. I couldn't answer it. Nor am I an epidemiologist. I know nothing about that.

Q. You are a resident of Atchison and you are generally familiar with what goes on with the public. Did you of your own knowledge hear of any water-borne disease?

A. I did not, sir.

Q. Did anybody complain to your company that they had been made ill by your water?

A. I received no complaints.

Q. So whatever the human error was, the effect on the human welfare and health was nothing?

A. It did have potentialities of transmission of pathogenic bacteria as long as those coliforms were present in that supply.

Q. It had the possibilities but it didn't do it, did it?

A. Probabilities you say?

Q. I am just talking about what happened, not what might happen or what might not. You didn't have any water-borne disease, did you?

A. As far as I know we didn't.

Q. All right, sir. Now, didn't you tell Mr. Minger and Mr. Bennett that you had never been concerned with suspended solids in the treatment of water down there?

A. I did. I told the gentlemen that I was more or less concerned with the sanitary aspects of the water rather than the chemical aspects.

Q. The water intake of your company is located north of your sewage outlets?

A. Yes, sir.

Q. You do not empty from Atchison any sewage north of where you take your water?

A. Well, I prefer you ask the City Manager when he takes the stand. I am not familiar with the sewage disposal, with the sewage system.

Q. You don't know where it is.

MR. BROWN: I believe that is all. Thank you.

A. Yes, sir.

CHAIRMAN SAMSON: Any further questions by any of the other interested industries?

Any questions by members of the Board?

MR. KURYLO: Yes, I have one, sir.

Q. (By Mr. Kurylo.) On direct examination you mentioned that in one of your treatment processes you were confronted with I believe what you described as a dangerous condition.

A. The danger of handling chlorine gas, particularly with men that aren't too familiar with it. It isn't exactly to be desired. There is always a danger of leakage. That is an emergency treatment and the equipment we used was probably substandard, hoses and clamps. Chlorine has no respect for those things; they do incur leaks and the inhalation of chlorine is definitely dangerous.

Q. You were referring to the danger to the operators of the--

A. To the danger to the operators, yes, sir.

Q. And not to the consumers of the water?

A. Not to any extent to the consumers of the water.

Q. These are emergency measures you indicate?

A. Those were emergency measures that I was forced to adopt.

Q. And how often have you adopted those emergency measures?

A. That is the first time that I have used that precaution.

Q. The first time?

A. Yes, sir.

Q. How long have you had that emergency equipment?

A. The emergency equipment--you wouldn't call it emergency equipment; it is standard equipment that was in the shop at the time. We use the manifolds and when they become clogged or anything we simply replace them. I had the hose and the manifold available and that is all it took.

MR. KURYLO: No further questions.

CHAIRMAN SAMSON: I have a question or two, Mr. Weatherford.

A. Yes, sir.

Q. (By Chairman Samson.) What was the cost of that installation of new system in 1943?

A. I can't answer that. I didn't have recourse to those figures, Mr. Chairman

Q. Well, approximately.

A. Approximately, I imagine, around $3,000.

Q. And why was it necessary to install that emergency equipment?

A. Because we recognized--

Q. Or that new system?

A. We recognized the need for more chlorine, that is we recognized the additional equipment would be necessary in years to come. And we thought that we had had adequate supply at 16 parts per million, which is a very high chlorine dosage and it should adequately have taken care of any contingency that arose on that Missouri River, but in later years it has become quite inadequate, I mean obsolete. As a result, we are going to be forced to spend between five and ten thousand dollars for new equipment.

Q. And what brings about that situation?

A. Just--I would say that increased tastes and odors and the poor bacteriological content of our water entering Atchison.

Q. Have you ever noticed any sludge banks come down the Missouri River?

A. I haven't discerned them. I have had very limited experience on the river, outside of a few excursions, and I do notice that when the river falls that there is a terrible odor that resembles sewage on those sand bars. I don't particularly like to be around it.

Q. Do you notice any concentration of grease or fatty substances or animal along the banks of the Missouri River?

A. I haven't had that experience, sir. I am not too familiar with it, I mean as far as walking up and down and looking for those things.

Q. There was some evidence here yesterday about a rat problem. Do you have any rat problem down at Atchison?

A. Well, I am not employed at the pumping station. I couldn't answer that question. I don't know whether they do or whether they don't. I have never heard anyone complain about rats around that section, though.

Q. Could you give us an estimate of the cost to your city of cleaning these filters two or three times a day from fat and hair?

A. I don't measure it in terms of cost, sir. It is just the necessity of doing it and the--it takes time for men to clean those things, it occupies their time when they should be profitably busy. The expense has been--

Q. How many men are engaged in that operation?

A. Two besides myself.

CHAIRMAN SAMSON: I have no further questions. Anything further?

**MR. STEIN:** No.

**MR. BROWN:** No, sir.

**CHAIRMAN SAMSON:** Mr. Schoenlaub?

**MR. SCHOENLAUB:** I have a couple more questions.

## CROSS-EXAMINATION

**BY MR. SCHOENLAUB:**

Q. This need for additional equipment in 1943 and again now you stated was due to increased taste and odor problems, is that correct?

A. Increased taste and odor, the poor bacteriological quality of the water. We didn't want to take any chance of running short.

Q. That increased bacterial count, how long has that increase been going on?

A. I couldn't answer that, sir.

Q. There has been noticeable increase in recent years?

A. You would have to contact Mr. Metzler of the State Board of Health for that information. I haven't that information. It is available. I did briefly glimpse the median coliform density graph--

Q. How long have you been sending these samples to the Kansas State Board of Health similar to the Exhibit 26 report?

A. Ever since I was employed by the Atchison Water Company.

Q. Those reports don't reflect such an increase?

A. I haven't taken the time to plot those.

Q. You took time to check this report?

A. Sir?

Q. You took time to check this report that is--

A. I thought it was very pertinent.

Q. But the reports in other years you didn't take time--

A. I have, I have looked at those reports, I can give you a general idea, but I certainly can't tell you exactly the coliform densities.

Q. What are they generally?

A. There are times when we have had exceptionally high coliform densities. I can remember indistinctly on one occasion, I can't even remember the date, but you will have that information from Mr. Metzler, where the coliform densities approached 400,000 and that is a terrific amount of coliform organisms in the river.

Q. Have you noticed a general rise in coliform density through the years?

A. There has been a rise in the densities, that is quite correct. How much, I am not prepared to say.

Q. Would you attribute that to a growth in population and industrial activity above you?

A. That is hard to answer, sir. I don't know your growth or the growth along the upper Missouri.

Q. You were attributing the tastes and odors earlier to population sewage and industrial activity. I assume that you would know the same facts concerning the increase in this taste and odor?

A. I have no idea of what your population equivalent is or what your population increase has been.

Q. You do have an idea, though, concerning the rise in coliform density?

A. It is a general idea, that is right.

Q. And you expressed knowledge concerning the type of contamination you are getting at Atchison as being industrial and sewage?

A. That is right, sir.

Q. Now, this increase that you have referred to, is that due to industrial and sewage pollution?

A. That I cannot answer. It is there and that is all I can say.

Q. But you can say that it is due to--that the odors are due to municipal sewage and industrial wastes?

A. I accept that generally, yes, sir, I am quite sure that a good many of those odors are due to sewage and industrial wastes. Just a moment--

Q. Just a minute.

A. I just happen to have a sample of this water right here that was collected from my flume. I would like for you to smell it. Maybe you can describe it.

Q. The odors which you have referred to and tastes as being attributed to municipal and industrial wastes, have they been on the increase in recent years?

A. They have, sir. The septic--

Q. Which to you would indicate a growth in population and industrial activity?

A. I cannot answer that question. I have no idea what your population increase has been along the Missouri River in general.

Q. But there has been, in your opinion, though--

A. Sir?

Q. There has been in your opinion, though, an increased amount of these odors and tastes in recent years?

A. There has been from 1955 on.

Q. Has it been a relatively steady increase?

A. I wouldn't call it steady or even progressive. I have that data here if I would be permitted to look at it and exhibit it. You are welcome to see it.

Q. You may look at it.

A. Yes, sir.

MR. EDELMAN: May I ask that that be marked for identification by the city, Mr. Chairman?

MR. SCHOENLAUB: If he is just using it to refresh his memory, I see no need to.

MR. EDELMAN: All right, if he is just going to refresh his memory it doesn't have to be marked.

A. Would the counsel care to look at these?

Q. (By Mr. Schoenlaub.) No. Your personal notes.

MR. STEIN: You may refer to them.

A. What was it, exactly, you wanted to know?

Q. (By Mr. Schoenlaub.) What, in your opinion, is the cause of these increased tastes and odors due to industrial and municipal sewage in recent years, specifically from 1943 to date?

A. Possibly from the industrial point of view there are a great many industries that are in practice right now that I don't think we had in 1943. I can't recall any right now, but the organic industry and with the advent of advancement of organic compounds, it is a certainty that the pollution must have increased since 1943.

Q. If I would state to you that such activity in the City of St. Joseph had been reduced and methods instituted to definitely cause a reduction in the discharge of this type sewage into the Missouri River since 1943, to what would you attribute these additional tastes and odors which you have--

A. I can't answer your question, sir. I do not know.

MR. SCHOENLAUB: I believe that is all.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. I had one of your witnesses taste our water. I will be willing to smell this.

A. Thank you. Shake it, please.

Q. (Sniffing.) It has got an odor, but I wouldn't say what it is.

MR. STEIN: Would you--

MR. BROWN: Do you want to take a smell, counsel?

MR. STEIN: May we? Do you think the Board might be interested?

Q. (By Mr. Brown.) Mr. Weatherford, while they are sampling that, I did neglect to ask you one question.

A. All right, sir.

Q. I believe you stated that these substances that came down the river came down at no specified time?

A. There isn't any--well, now let's go into that a little further. There are times when we have a long session of it. Last May, in 1958, we had an intense odor down that river and I think that existed until July or June 9th. It was of quite long duration. But the ordinary--

Q. But you are talking about these substances and you said they would come down, maybe be there for a few hours, and it could be any time of the day or night?

A. From all appearances it came down in slugs, whatever it was came down in slugs at one time or another.

Q. But you did say that it came down at no set hourly time? That is correct, isn't it?

A. That is correct.

Q. Now, the industries in St. Joseph operate on rather set schedules?

A. That is correct.

Q. And if the river distance from St. Joseph to your intake is fixed in mileage and the river flows constantly--what?--about 6 miles an hour, if this was from the wastes of the industrial district you would expect it to arrive at your intake at rather fixed periods each day, wouldn't you?

A. Well, I am going to question the velocity of that river as 6 miles an hour. That I don't think is the mean average velocity of that river, sir.

Q. Well, the velocity of the river remains relatively constant, doesn't it, except in times of high water?

A. It does not. Excepting in times of high water, that is right.

Q. All right. So you would expect this stuff ordinarily to arrive at fixed times, wouldn't you?

A. Well--

Q. If it is from the industrial district? That is just logical, isn't it? You don't have to answer it if you don't want to.

A. I specified that it arrived at varying intervals. I don't always mark the time down, Mr. Brown.

Q. If you don't want to answer it, it is all right.

A. Thank you, sir.

MR. BROWN: That is all. Thank you.

CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. And the same--if I may--earlier Government witnesses have testified that the industrial wastes are predominant at certain times of the day and municipal wastes are predominant also at certain definite times of the day, which, as Mr. Brown requested of you, would not that indicate to you, with the constant velocity of the water, that you could anticipate the time of day in which all of those odors and tastes would reach your intakes?

A. I have never taken that into consideration.

MR. SCHOENLAUB: That is all.

Q. (By Chairman Samson.) What is the population of Atchison?

A. We supply approximately 18,000 people, sir.

Q. And how many river miles, approximately, separates St. Joe from Atchison?

A. Possibly 24 to 25, plus or minus. 24 plus or minus miles.

Q. Now, you made some remark about the sewage treatment plant. Are you installing a sewage treatment plant?

A. We are, sir.

Q. And what is the cost of that?

A. Mr. Yerkes is going to testify this morning. I prefer he give you the figures on it. Approximately a million and a half dollars.

Q. And how is that being financed?

A. That is financed by surcharge on our water bills.

Q. I see.

A. We are paying for it.

Q. Are there any cities or any large industrial areas located between St. Joe and Atchison, Kansas, on the Missouri River?

A. There are no industries whatever located between St. Joe and Atchison, Kansas, that I know of.

Q. Yes.

A. And there is only one small tributary that is a clear water stream, it doesn't materially affect the discharge of the Missouri River whatever.

Q. Have you ever personally been on the river in a boat?

A. I have, sir.

Q. Have you come upstream and gone downstream from Atchison?

A. I have gone up and down.

Q. When was the last time you were on the river?

A. It has been several years, many years ago, sir.

Q. I see.

A. Possibly 1950, 1951.

Q. Now, I take it your water intake is not located at the same place that you treat your water?

A. No, sir.

Q. How much distance separates them?

A. 5,000 feet.

Q. About a mile?

A. About a mile, sir.

Q. And your operations primarily or your office is located down at the water treatment plant, is that right?

A. My office is located at the filtration plant.

Q. Well, where is that in respect to the--

A. That is at the same distance fsom the treatment--that is at the treatment plant.

Q. And that is about 5,000 feet from the intake?

A. Yes, sir.

CHAIRMAN SAMSON: I believe that is all.

MR. POOLE: I have one question.

Q. (By Mr. Poole.) You referred to additional chlorinator capacity in 1943, now another contemplated addition. My question is, what is the relative value of your pumpage in 1943 against your 1949 pumpage?

A. We were pumping more water in 1943 than 1949 or at the present date because we were on a flat rate basis and people just used water indiscriminately and we weren't metered.

Q. In other words, this addition that is contemplated now, then, is not brought about by the necessity for producing more water?

A. No, sir.

Q. Than you did in '43?

A. No, sir.

MR. EDELMAN: May we have the bottle introduced by the witness marked for identification as Government Exhibit No. 27? It is labeled "Sample collected raw water flume". What is that date?

A. July 15, 1959.

MR. EDELMAN: "July 15, 1959, by A. E. Weatherford, Plant Operator."

(Government Exhibit No. 27 marked for identification.)

## REDIRECT EXAMINATION

BY MR. EDELMAN:

Q. Is this perishable material, Mr. Weatherford?

A. I don't understand what you mean by perishable.

Q. Will this retain its identity if it is kept as an exhibit?

A. It possibly will for a few more days. I have had that under incubation and if it comes in contact with heat you might get biochemical oxidation of it.

Q. (By Mr. Stein.) Do you mean refrigeration?

A. I had that sample under refrigeration so I wouldn't entail any biochemical oxidation.

MR. STEIN: Thank you, sir.

Q. (By Mr. Edelman.) Since this probably will not keep without refrigeration, for the purpose of the record, Mr. Weatherford, could you describe the smell?

A. (Sniffing.) It has changed. It is more septic at the present time, but it was definitely a strong sewage smell when first collected.

MR. STEIN: We have no further questions.

CHAIRMAN SAMSON: The witness may be excused if there is no further cross-examination.

MR. SCHOENLAUB: Are they offering that bottle in evidence?

MR. EDELMAN: Since Mr. Weatherford has indicated that if kept without refrigeration it would be subject to degradation, we are not offering it into evidence.

CHAIRMAN SAMSON: You may be excused, Mr. Weatherford.

(Witness excused.)

MR. STEIN: Mr. Chairman, at this time we would like to swear in another group of witnesses, if we may.

CHAIRMAN SAMSON: Very well, proceed.

MR. STEIN: Mr. Yerkes, Weigand, Becker and Cord.

MR. AYERS: Would you call the names of your witnesses again, Mr. Stein.

MR. STEIN: Mr. Yerkes, Weigand, Becker and Cord.

(Witnesses sworn.)

MR. STEIN: Mr. Yerkes.

WILLIAM R. YERKES,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. STEIN:

Q. Mr. Yerkes, would you state your name and address for the Board?

A. William R. Yerkes, City Hall at Atchison, Kansas.

Q. What is your position at Atchison, Kansas?

A. I am the City Manager.

Q. Mr. Yerkes, has the city made any investment in water front improvement for commercial activities?

A. Yes, the city has constructed a dock or barge facility that was done about five years ago and additional work was begun on that to put it into an operating condition this past year.

Q. Have operations on that commercial barge facility actually begun?

A. Yes, the first outbound shipments were made about two months ago. There have been others since and the recent strike has prevented further activity this season.

Q. Are you in your city planning other further industrial and water front development of a commercial nature?

A. Yes. There has been a considerable amount of planning work for the development of this commercial activity along the river front, some of it to be done by the city and some is contemplated or at least being considered by a group of developers who are interested in promoting this activity and at least one private concern has indicated plans for use of the river front.

Q. Is this projected and proposed industrial development based, in your opinion, on expanded barge use?

A. Yes, sir, primarily so.

Q. Do you think that the quality of the water, of the polluted condition of the water, as it flows past Atchison would affect its use for commercial barging?

MR. BROWN: Just a moment, Your Honor. There is no qualification in this man to express an opinion as an expert on what does or does not constitute an impediment to navigation. That is all we are getting at here. I don't think this man is qualified.

MR. STEIN: May I rephrase that question?

CHAIRMAN SAMSON: I will sustain that objection, counsel, unless you--

MR. STEIN: I will rephrase the question.

CHAIRMAN SAMSON: Very well.

I see that the hour for adjournment has arrived, so possibly this will be a good time to adjourn.

MR. STEIN: Sir, would it be possible for us to go ahead and try to get Mr. Yerkes completed for another five minutes? Because he is City Manager.

MR. BROWN: I have got a car waiting for me at 20 minutes of 10 to take me to this funeral. I am the fly in the ointment and I am terribly sorry about this.

THE WITNESS: I am in no great rush.

MR. STEIN: Very well. Thank you, sir.

CHAIRMAN SAMSON: Very well. We will adjourn, then, until 11 o'clock or sooner if possible.

MR. BROWN: Just the moment I get back. Thank you very much. I am sorry to inconvenience everybody.

CHAIRMAN SAMSON: That is all right.

(RECESS)

CHAIRMAN SAMSON: Gentlemen, the hearing will come to order and we will proceed.

Q. (By Mr. Stein.) Mr. Yerkes, in your industrial water front plant do you take the water quality of the Missouri River into account?

A. I would answer that by saying that the matter nearly always comes up for discussion whenever we are talking to people concerned with the development of the river front.

Q. How does this affect your planning?

A. Well, directly perhaps--you mean, now, the physical planning?

Q. Yes.

A. Perhaps the physical planning it has little effect on.

Q. How does it affect your future industrial planning in interesting industries to come in?

A. I would say that it has some influence on the people who are concerned and interested in possible river development to the extent that it is a factor that they take into consideration as they are considering investments for that purpose.

Q. Do you think it is adverse or favorable?

A. It is adverse.

Q. Does Atchison have a sewage treatment plant?

A. It does not.

Q. Is it going ahead with construction of a sewage treatment plant?

A. A sewage treatment plant has been authorized for construction, some of the money has been borrowed for that purpose, and the planning is completed. We are now awaiting the approval of final plans by the Public Health Service and will be ready shortly to let a contract for its construction.

Q. Has Atchison provided a municipal dock?

A. It has.

Q. What do people use this dock for?

A. We have two. The one that I referred to earlier was for commercial transportation--

Q. This is on the shores of the Missouri River, both of these docks are?

A. Yes, they are both on the river banks. One is for commercial barge use and the other is a recreational ramp for loading recreation boats into the river and removing them from the river.

Q. Do people use that recreational dock?

A. The recreational dock use is increasing quite rapidly. The past year or two we are having a lot of interest locally in recreational use of the river.

Q. The people in addition, do they go boating from this recreational dock?

A. Yes, sir.

Q. And do they ever go water skiing?

A. Yes, sir.

Q. Have you ever gone boating from the dock?

A. Yes, sir, I have.

Q. Have you gone water skiing?

A. No, sir, I have not.

Q. Have you seen other people water skiing?

A. Yes, sir, I have.

Q. In this water skiing do they come into contact with the water and the spray?

A. Very frequently and continuously.

Q. Does the municipal government of Atchison consider the recreational potential of the Missouri River as an asset of that city?

A. Yes, they do, and I think that is evidenced by the fact that they have used public funds in the construction of the recreational boat launching ramp and there have been discussions about further improvement of the river frontage there for that purpose.

Q. About how much has the city spent for all purposes on improving the water front?

A. I don't have those figures, Mr. Stein, I have made no computation, but to the best of my recollection in round figures I would say between $15,000 and $20,000. That includes both the recreational and the commercial facilities that have been built.

Q. Did you make any assumptions about the water quality of the river in spending these funds?

A. Well, I would say we made the assumption, the governing body made the assumption, that the water quality of the Missouri River was to be improved, because that was the basis on which we have proceeded, understanding that there was an agreement among the five states that the pollution was to be abated.

Q. Now, what is the motivating force, would you say, in your city in having you spend your own money for a sewage treatment plant?

A. Well, I would say there are two reasons. First is the fact that under this five-state agreement we have been ordered to do this by our own Kansas State Board of Health. I think there is a public interest feeling on the part of our governing body in Atchison that this is a common problem that all cities are going to have to assume the responsibility for and they in Atchison are willing to do that and have done so.

Q. To get back to your personal experience, you say you boat on the river?

A. Yes, sir, I do.

Q. Have you ever noticed any odors on that river?

A. Yes, I have, frequently.

Q. What type of odors? Are they pleasant?

A. No, they are offensive. I might--I recall an experience I had I believe three weeks ago when we had out-of-town guests that we took boating on the river and I think their first remark on approaching the boat launching area was some derogatory remark about the odor that happened to be on the river that day.

Q. About where do you encounter these odors, Mr. Yerkes?

A. Oh, they are rather--I think during those periods when the odor is noticeable it is rather generally scattered up and down the river from Atchison.

Q. Do you notice these odors on the river when the river is relatively low or do you notice any difference when it is low or high?

A. I don't believe I have noticed the river level sufficiently to comment on that.

Q. Have you ever seen any matter in the water when you went boating there at Atchison, such as foam and waste matter?

A. Yes, sir.

Q. How often do you see that?

A. Well, the foam condition rather periodically, I don't know how often, perhaps sometime during each week, we might say, there would be that condition. It happened to be on there Sunday because I was on the river and noticed it particularly this past Sunday.

Q. When you speak in terms of these odors and the foam and waste matter, are you referring to areas above the Atchison Sewer outfall?

A. Both above and below.

Q. Mr. Yerkes, in your job as City Manager do you routinely receive reports from the Kansas State Board of Health of its analyses of the raw water processed by the Atchison water treatment plant?

A. Yes, sir, I do.

Q. As a City Manager are you concerned with these reports?

A. Yes, sir, I am.

Q. Why?

A. Because of the very high coliform bacteria count that is rather consistently shown.

Q. Do you consider it your duty to protect the health of the people of the city?

A. Yes, sir.

Q. Do you consider that this high coliform count gives you the margin of safety you would desire?

A. With the qualification that I am not a technician it does, what little I have been able to learn about possible effects of coliform bacteria.

MR. STEIN: I have no further questions.

CHAIRMAN SAMSON: You may cross-examine.

MR. SCHOENLAUB: No questions.

MR. BROWN: I have no questions.

Oh, one.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Are your sewer outlets below your water intake?

A. The principal sewer outfall is below. We have one sewer outfall which actually is above the water intake, which is a diversion structure that is designed to divert water directly to the river during conditions of heavy rainfall, in which case the river is up and the water--a small area of the city, then, the storm water is directed to this outfall.

MR. BROWN: Thank you.

CHAIRMAN SAMSON: Anything further, Mr. Brown?

MR. BROWN: No, thank you.

CHAIRMAN SAMSON: Questions by the Board?

MR. JOHNSON: I have one question.

CHAIRMAN SAMSON: Mr. Johnson.

Q. (By Mr. Johnson.) Would you clarify that statement? This one outlet outfall above your water intake is strictly a storm sewer?

A. Yes, it functions only when there is sufficient runoff from a small area of the city that gets into the storm water intakes and then this is diverted to the river when the level gets up well above the normal flow. This is a--we have a combined system there and this is one of the structures that is included in our modification program and as soon as we get into construction this will be further improved so that there will be a complete separation there between normal flow and heavy flows.

MR. JOHNSON: Thank you.

CHAIRMAN SAMSON: Any further questions?

I have a question or two, Mr. Yerkes.

Q. (By Chairman Samson.) What is the population of Atchison?

A. The official population of the city itself is 13,009.

Q. And does your city have a sewer-use fee?

A. We have inaugurated a sewer-service charge in order to finance the sewage treatment plant and the modification of the system. This charge has been imposed and is being collected for the purpose of doing this work.

Q. Would you relate to the Board generally what that charge is and how the charges are predicated?

A. The charges are based on the volume of water used. We have an arrangement with the Water Company whereby their meter readings are used as the basis for our sewer-service charges. The charges are based on the first three months of the calendar year, that being assumed to be the low water usage for the individual customer. After that is averaged up, the rest of the year is a monthly billing based on the first three months average. We are collecting at the present time half of what will be the fee, a minimum charge of $1 a month, which will become $2 a month as soon as construction or as soon as the plant is put into operation and it is graduated, then, up on a volume basis.

Q. What would you say would be the average household charge on this sewer-use fee?

A. At present under the half rate I can give you an example of my own that I suppose might be considered an average. I am paying $1.16, I think, now.

Q. And then industry, of course, will be charged on the same basis at the same rate as the household user?

A. Well, it will be a graduated rate. They will pay the first increment at the same rate, the next at a slightly lower rate, and it is graduated up based on the volume.

Q. Then do you have sufficient funds on hand at the present time to construct the plant?

A. We have-- We are authorized to borrow $1,420,000 for this construction, of which we have actually borrowed $500,000. We are collecting, as I say, this half rate, which is being put aside in the various funds for the purpose of this financing, including the maintenance and operation of treatment plant. But this is authorized and as soon as we have the approval of the Public Health Service and we are all cleared on our plans, then we will issue the rest of the funds as it is required.

Q. Now, you say that you have been authorized to do such and so. Is that by a general referendum vote or is that by authority of the City Council or your governing body?

A. The City of Atchison is authorized by state law to issue these bonds on a notice of intent, which permits the public to call for a vote by filing a petition under certain conditions. The period for filing this petition, which would then have required a public vote, passed without any opposition in any form and, therefore, the authorization is complete without a vote in this case.

Q. Now, are those general obligation bonds that will be involved or are they based on revenue?

A. No, these are entirely revenue bonds. At present there is no tax levy being made for that purpose. It is entirely revenue bonds, paid for out of the service charges that are being collected.

CHAIRMAN SAMSON: I believe I have no further questions.

You may be excused.

(Witness excused.)

MR. STILLINGS: Mr. Chairman, I am William E. Stillings of Atchison. I appear at this time on behalf of and as Secretary of the Atchison Flood Control and Water Front Development Association. Mr. John A. Adair, President of that Association, was scheduled to appear here as a witness. He is in the hospital and the association of which I am Secretary has as a result of that adopted a resolution which it would like to present and copies of which I will present to counsel. I am with Mr. Yerkes. I would like your indulgence at this time to accept this resolution. I give copies to the counsel.

CHAIRMAN SAMSON: Will you kindly furnish copies of it to counsel involved?

MR. STILLINGS: Yes, sir.

CHAIRMAN SAMSON: And will you then give the original to Mr. Ayers so that he may mark it as an exhibit?

MR. STILLINGS: I offer this for whatever purpose the Commission might, under the rules under which it is operating, be able to accept it.

CHAIRMAN SAMSON: Very well.

MR. AYERS: Should this be marked as one of Atchison's exhibits or what?

CHAIRMAN SAMSON: As I understand it, the Government is not producing this evidence. Is that right, Mr. Stein?

MR. STEIN: That is correct, sir.

CHAIRMAN SAMSON: And it is being brought in here by the City of Atchison.

MR. EDELMAN: I did not--

MR. STILLINGS: It is a private organization in Atchison. It is not the City of Atchison. It is a private organization which happens to be located in Atchison which is interested in flood control and water front development on both sides of the river in the Atchison area.

CHAIRMAN SAMSON: Very well.

MR. AYERS: Is it agreeable to the Chairman that I mark it Atchison Flood Control and Water Front Development Association Exhibit 1?

CHAIRMAN SAMSON: That is agreeable with the Chair.

MR. AYERS: So marked.

(Atchison Flood Control and Water Front Development Association Exhibit No. 1 marked for identification.)

MR. STILLINGS: I then move that it be introduced in evidence as Atchison Flood Control and Water Front Development Association Exhibit 1.

CHAIRMAN SAMSON: Do you have any remarks to make in connection with it, Mr. Brown and Mr. Schoenlaub?

MR. BROWN: I have none.

MR. SCHOENLAUB: I object to its admission, Your Honor. There are many matters of an evidentiary nature in this resolution and we are not being given an opportunity for any cross-examination on its contents by the persons who have stated the matters contained in it. Therefore, I object to its admission for any purposes.

CHAIRMAN SAMSON: Subject to your objection, Mr. Schoenlaub, this exhibit will be received.

(Atchison Flood Control and Water Front Development Association Exhibit No. 1 received in evidence.)

MR. STILLINGS: Thank you.

CHAIRMAN SAMSON: You may proceed.

MR. STEIN: Mr. Fisher.

**HERBERT J. FISHER,**

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

## DIRECT EXAMINATION

BY MR. STEIN:

Q. Will you state your name and address for the Board?

A. Herbert J. Fisher, 903 Elm, Columbia, Missouri.

Q. You will recall, Mr. Fisher, that you were previously sworn and that oath still obtains?

A. Yes.

Q. What is your position, Mr. Fisher?

A. I am Fishery Biologist for the Missouri Conservation Commission.

Q. As part of your official functions does your Commission receive complaints concerning conditions which are deleterious to fish in the Missouri River?

A. They do.

Q. Does your Commission issue commercial licenses to fishermen in that river?

A. They do.

Q. Can you outline-- Have you received any such complaints?

A. We have received--

MR. SCHOENLAUB: Your Honor, I object to any testimony along that line as being hearsay and that if there are any complaints the complaining parties should appear and testify so that we could have an opportunity to cross-examine them.

CHAIRMAN SAMSON: I believe this is merely foundation, Mr. Schoenlaub, and with that in mind I will overrule your objection.

Q. (By Mr. Stein.) Go ahead.

A. We have received complaints from commercial fishermen at times of an oily flavor to fishes in the Missouri River.

Q. Has your Commission ever made studies in response to such complaints, investigations of the river?

A. My connection with the case in point is limited to a survey made in 1945 and on October 22, 1953.

Q. Will you tell us what you have--the results of those observations?

MR. BROWN: Just a moment, Your Honor, I would object to that for this reason. The exhibits of the Black & Veatch Reports which the Government has introduced show conclusively that there have been vast changes since 1955. Therefore, Herbert Fisher's findings--I have all the respect in the world for Mr. Fisher, but his findings on prior dates would not be competent in this matter.

CHAIRMAN SAMSON: For whatever evidentiary value there is, and keeping in mind that he has made these observations in '45 and '53, I will permit this witness to answer.

A. In 1945 we conducted a fishery survey of the Lower Missouri River. One of our stations was located opposite Lake Contrary, which I believe is roughly two miles below the City of St. Joseph.

CHAIRMAN SAMSON: How many miles, Mr. Fisher?

A. I think it is around two miles. I may be wrong on that.

CHAIRMAN SAMSON: I see.

A. During the netting of the survey we noted considerable amounts of straw and what appeared to be animal tissue and some evidence of sewage upon the nets that we lifted in the area. In 1953, October 22nd to be exact, following a complaint of oily-tasting fish in the Missouri River below St. Joseph, we made an inspection of the river from the south limits to the north limits of the city. Now, I do not have the information of the exact locations of the sewer outlets that we inspected. However, during the inspection at various outlets we found manure, sewage, and in two cases some oil along the banks of the outlet.

Q. (By Mr. Stein.) To your knowledge has there been any increase in this municipal and industrial discharge since '45?

A. I have no information on that.

CHAIRMAN SAMSON: What is your answer?

A. I have no information on that.

CHAIRMAN SAMSON: Very well.

Q. (By Mr. Stein.) Are commercial fishermen-- Do commercial fishermen file reports with your organization, with the Missouri Conservation Commission?

A. They do.

Q. As part of your regular records were any such reports filed in December '56?

A. There was a report on oil pollution filed in December of '56.

Q. What did that report say, according to your official records?

MR. SCHOENLAUB: Your Honor, there again I object to that line of testimony for the reasons that we have not had an opportunity to cross-examine the complaining parties.

CHAIRMAN SAMSON: Subject to that objection I am going to permit the witness to answer.

A. I can not recall the exact words, but as close as I can recall the statement mentioned that the fishermen were not fishing due to oil in the river and that one fish out of every five was not usable.

Q. (By Mr. Stein.) Why weren't they usable?

A. Because of the oil or the pollution in the river.

Q. Was that due to the taste of the fish, I mean the oil, or what?

A. During the discussion with the commercial fisherman that went with us on the October 1953 inspection this fisherman mentioned that the fish in the area, some of the fish in the area, had an oily flavor, and I have to use that as my basis of comment at this time.

Q. Well, if we assume the continuance of garbage, municipal wastes and industrial wastes, oil and tar that you have seen in the Missouri River, on the basis of your personal observation what effect would that have on fish, fish habitat and wildfowl habitat?

MR. BROWN: Just a moment. I object to that. That hypothetical question assumes facts which are directly contrary to the evidence. The Government can't assume facts contrary to its own evidence. Their own evidence shows there has been material reduction since Mr. Fisher made his investigation. Therefore, he can't assume for the purpose of the answer that the same conditions have continued to exist.

MR. STEIN: I think our evidence, if anything, might have shown a substantial reduction of industrial wastes.

MR. BROWN: He hasn't differentiated between industrial sewage and city sewage. He has just said there was a general condition and there is a vast reduction in it. I object to the question.

CHAIRMAN SAMSON: Subject to the objection, I am going to permit this witness to answer.

A. I wish that question to be restated.

Q. (By Mr. Stein.) Assuming the continuance of untreated wastes from the city outlets of St. Joseph that you observed and oil and tar coming out into the river, what effect would this have on the fish, fish habitat and waterfowl habitat of the Missouri River?

A. Well, I think that it would have an adverse effect upon these items over the period of time that you mentioned, probably a slowly retarding effect over some period of time.

Q. Would this affect sport fishing, hunting and commercial fishery, would this be slowly degrading on those too?

A. I would assume so.

MR. STEIN: No further questions.

CHAIRMAN SAMSON: You may cross-examine.

MR. SCHOENLAUB: I just have one question.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Fisher, wasn't 1953 the year you were having reports of oil and other substances of unknown origin fouling the fishing on most of the rivers and lakes within the State of Missouri?

A. I do not recall for sure about that "most of the rivers and streams in the State".

Q. I will rephrase it. Many of the streams and specifically the large lakes, such as Lake of the Czarks?

A. I do not recall any report received by me of oil on the Lake of the Ozarks in 1953.

Q. Oily substances fouling the lines of game fishermen?

A. No, sir.

MR. SCHOENLAUB: No more questions.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Herb, so the Board may understand it, one thing Missouri has prided itself on was the building of farm ponds for fishing opportunities?

A. Yes, sir.

Q. And I think it is acknowledged that we have more farm ponds than any state in the union, isn't that correct?

A. I believe that is correct.

Q. And the Commission has found that the fertility of those ponds and the welfare of the fish in them are materially increased by introducing organic fertilizer?

MR. STEIN: Has that been introduced in evidence that the Commission has found that?

CHAIRMAN SAMSON: I think he is speaking about Missouri.

MR. BROWN: I am asking him.

CHAIRMAN SAMSON: I think he is referring to the Missouri Commission.

MR. BROWN: I am speaking of the Missouri Commission.

Q. (By Mr. Brown.) That is correct, isn't it?

A. You mentioned organic fertilizers. If I recall, our book or pond book on that calls for inorganic fertilizers, I believe.

Q. You frequently use manure, don't you?

A. I don't believe that is mentioned in there, is it?

Q. Are you sure about that?

A. I am not sure.

Q. You know that organic fertilizer is shipped down here by various industries to be applied in farm ponds?

A. Organic fertilizer?

Q. Yes, sir.

A. I do not know, but it might be.

MR. BROWN: I believe that is all. Thank you.

CHAIRMAN SAMSON: Any questions by the Commission?

DR. MARTIN: Yes.

Q. (By Dr. Martin.) Mr. Fisher, could you tell us whether fish in general seek out waters which are highly polluted by sewage and other discharges or do they avoid such waters?

A. Sir, that is a rather difficult question to answer, because in some cases where the oxygen has not been so depleted as to work a barrier to the fish they might feed upon some of the organic matter, providing that the organic matter had not decomposed to a point to lower the oxygen beyond the lethal limits that the fish can take.

Q. Could you tell us, with reference to the taste that has been mentioned, that people have complained that the taste of certain fish taken from the river is unpalatable or of off-flavor, have any tests been made to determine whether there is actually any change in the chemical composition of the tissues of these fish which would indicate that such a change in flavor did actually exist and was actually due to some pollutant entering the river?

A. We, the Conservation Commission, as far as I know, have not made such tests. However, at the recent Cincinnati Laboratory, our second seminar for biological problems, there was mentioned there that a taste test experiment was being conducted by, I believe, the Dow Chemical Company. Whether the findings are available for publication at the present or not, I do not know.

Q. Did this deal with fish taken from the reaches of the Missouri River which are under discussion?

A. No.

DR. MARTIN: Thank you.

CHAIRMAN SAMSON: Any further questions?

Mr. Fisher, I just have a question or two.

Q. (By Chairman Samson.) In your examination of the river in '45 and '53 did you pretty much cover the river from the Kansas side to the Missouri side?

A. In the survey we worked both sides of the river. Most of the test netting was done, oh, within one mile below the southern limits of the city. In 1953, the one-day inspection, we covered the river from about a mile and a half below the outskirts of the city to what appeared to be the north boundary of the city.

Q. And did you pretty much examine the river from the Kansas side of the river to the Missouri side of the river?

A. Not on the second--not on that one day survey. We just examined the Missouri side of the river.

Q. And generally observed the sewer outfalls and the conditions of the river?

A. That is correct.

Q. Have you done any fishing in the Missouri River yourself in the St. Joe area?

A. My fishing in the St. Joe area was limited to running nets in the 1945 survey. Since that time I have not fished in the area.

Q. Well, now, when you run the nets you put on your breast waders or hip boots, do you, and work with these nets in the water?

A. That is correct.

Q. You and some other gentleman, I take it?

A. That is right.

Q. And where was that netting done, was that done in the neighborhood of Lake Contrary?

A. Yes. And, as I stated before, some distance above and some distance below in the area. Most of it was within--

Q. Well, at that time, for whatever it is worth, what did you observe as far as the river was concerned and the pollution and the problem that we have at hand?

A. At that time we would see on occasion some floating straw and what appeared to be some pieces of animal tissue on the surface of the water. Then also, as I mentioned before, we would find it caught in our nets when we lifted the nets periodically.

Q. Was that industrial waste or domestic waste or both?

A. Well, if the animal tissue was industrial waste that would be considered industrial waste, I imagine. And there was evidence of sewage.

Q. That is domestic waste that would come from a household?

A. Domestic waste, that is correct.

CHAIRMAN SAMSON: I have no further questions.

MR. BROWN: I would like to ask Mr. Fisher a question.

CHAIRMAN SAMSON: Certainly.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. Herb, considering that chicken entrails and all sorts of rotten things, organic matters, are used for catfish bait, doesn't that indicate the catfish feed on that?

A. Yes, they will feed upon it under certain conditions, Mr. Brown, in an environment where the oxygen would be suitable for their livelihood, I imagine.

Q. And such baits are used generally in Missouri on all the rivers, Mississippi, the Des Moines, the Missouri?

A. I believe they are.

MR. BROWN: Yes, sir. That is all, thank you.

Q. (By Chairman Samson.) You seem to make some differentiation on the oxygen content of the water and the lethal limits thereof. Is there a problem in that connection, as far as you know, in the St. Joe area on the Missouri River?

A. I am not sure whether there would be a problem here in the St. Joseph area. Generally speaking there is a problem over the state, I would say.

CHAIRMAN SAMSON: I have no further questions.

Any other questions from the Board? From counsel?

You may be excused.

(Witness excused.)

MR. STEIN: Mr. Cord.

GEORGE E. CORD,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

## DIRECT EXAMINATION

**BY MR. EDELMAN:**

Q. Will you give your name and address to the reporter?

A. George E. Cord, Leavenworth, Kansas.

MR. EDELMAN: Let the record show that Mr. Cord has been sworn.

MR. BROWN: How do you spell that last name?

A. C-o-r-d.

MR. BROWN: Thank you.

Q. (By Mr. Edelman.) Mr. Cord, do you hold a commercial fisherman's license?

A. I do.

Q. What area of the Missouri do you fish in?

A. Mostly from Oak Mills down to Leavenworth.

Q. Where is Oak Mills with respect to St. Joseph, above or below?

A. Oh, way below.

Q. About how far?

A. It is about halfway between Atchison and Leavenworth.

Q. I see. What kind of fish do you usually fish for?

A. Mostly rough fish, carp, buffalo, catfish.

Q. How do you catch them?

A. With a net?

Q. In this area of the river have you seen material floating on the surface of the water?

A. Yes.

Q. Could you describe it?

A. Well, most of it is garbage, you see more of that than anything else, and a lot of just grease, could be sewer grease.

CHAIRMAN SAMSON: Mr. Edelman, it is a little difficult to hear Mr. Cord up here.

A. I am sorry, sir.

Q. (By Mr. Edelman.) Would you repeat your answer, please, Mr. Cord?

A. Well, yes. Mostly whatever I see is garbage, fruit rinds and most of the time that is in the wintertime, I guess it doesn't have a chance to deteriorate, and a lot of sewer grease, just plain old everyday grease, that is all I can see it is.

Q. Have you seen this grease recently?

A. Not so much in warm weather. Wintertime is when you see it most.

Q. Now, have you observed people using the river for recreation in this area?

A. That is the only place we have, hardly, unless you go a long ways.

Q. Have you seen people boating in the river?

A. Oh, yes.

Q. Recently?

A. Yes.

Q. Have you seen people water skiing?

A. Yes.

Q. Have you seen them swimming?

A. Yes.

Q. Has this kind of use of the river increased recently?

A. Oh, tremendously.

Q. Could you estimate it for us?

A. Oh, well, I imagine there is--I guess there is a hundred outfits just from Leavenworth alone, which used to be five or six years ago there wasn't no one had an outboard motor unless they were a fisherman or hunter.

Q. (By Mr. Poole.) What was that, a hundred outfits, is that it?

A. I imagine there is that many.

MR. EDELMAN: We have no further examination, Mr. Chairman.

CHAIRMAN SAMSON: Cross-examination, gentlemen?

MR. SCHOENLAUB: No questions.

MR. BROWN: I have none.

CHAIRMAN SAMSON: Members of the Board desire to ask any questions?

I believe I have none. You may be excused.

(Witness excused.)

MR. STEIN: Mr. Becker.

JOE BECKER,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. STEIN:

Q. Mr. Becker, will you state your name for the Board?

A. Joe Becker.

Q. What is your address?

A. Leavenworth, Kansas.

Q. Mr. Becker, do you have a commercial fishing license?

A. I do.

Q. Where do you fish?

A. Well, about the south end of Leavenworth.

Q. What do you catch?

A. Well, most all kind of fish, that is I fish practically every day.

Q. Will you specify? You catch carp?

A. Well, what do you mean?

Q. What kind of fish, what are the names of the fish?

A. Well, carp and catfish, sturgeons, drum.

Q. Buffalo?

A. Yes, buffalo.

Q. How do you fish, what do you use to fish?

A. Well, I use lines and nets both, hoop nets.

Q. Did you ever notice any material in the water other than fish that catch on your net and lines?

A. Oh, yes.

Q. Would you describe that for us?

A. Well, chunks of fat and, oh, I get lettuce and carrot tops and stuff like that.

Q. Have you ever found any condoms in your net?

A. Oh, plenty of them, bushels of them.

Q. How about animal entrails, guts of animals?

A. Yes, even that.

Q. Do any of the fish you ever catch have an oily taste?

A. Yes.

Q. Have you ever had any complaints from customers?

A. I have that.

Q. What do you do when they complain?

A. Well, I have just got to replace them with good fish.

Q. Supposing you don't have any good fish to replace them with?

A. Well, I just have to keep catching until I get them.

MR. STEIN: No further questions.

CHAIRMAN SAMSON: Any cross-examination, gentlemen?

MR. SCHOENLAUB: No questions.

MR. BROWN: I have none.

CHAIRMAN SAMSON: Members of the Board any questions?

MR. KURYLO: Yes.

Q. (By Mr. Kurylo.) Where are those customers located?

A. Well, most of them is right pretty close to where I live, and my community.

Q. Where is that, in Missouri or Kansas?

A. Kansas.

MR. KURYLO: No further questions.

Q. (By Chairman Samson.) What is your address at Leavenworth, Mr. Becker?

A. 2500 Wilson.

Q. And how long have you been on the river in years?

A. Oh, my. Practically all my life.

Q. Well, would it be embarrassing to you to tell us what your age is?

A. Well, 55. Still a spring chicken.

DR. MARTIN: I have a question, Mr. Chairman.

Q. (By Dr. Martin.) Mr. Becker, did I understand you to say that you fished at the south edge of Leavenworth below the city?

A. Right at the south edge of Leavenworth. It is still in the city, yes.

Q. Is this above or below the sewage outfalls of Leavenworth?

A. Well, it would be below.

DR. MARTIN: Thank you.

MR. BROWN: May I ask a question?

CHAIRMAN SAMSON: Surely.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. How long have you had a commercial license?

A. Since about '48.

Q. And do you have regular customers that buy from you regularly?

A. Yes.

Q. Keep coming back?

A. Yes.

Q. Seem to like the flavor of the fish?

A. Yes.

Q. And you get those fish right below the outfalls of the Leavenworth sewers?

A. Well, I can't help that.

Q. Well, I can't either. That is all I wanted to know.

A. I can't help that.

MR. BROWN: That is all. Thank you.

CHAIRMAN SAMSON: You may be excused.

(Witness excused.)

MR. EDELMAN: At this time we would like to recall Mr. Kittrell.

F. W. KITTRELL,
resumed the stand and testified further as follows:

DIRECT EXAMINATION (Cont'd.)

BY MR. EDELMAN:

Q. Mr. Kittrell, when you concluded your testimony yesterday we were discussing Government Exhibits 24 and 25. Now, on Government Exhibit No. 25 there are some lines across the bottom of that chart which are headed "Water Supply" and "General Recreation" and "Swimming". Can you tell us what those levels indicate, Mr. Kittrell?

A. Well, the upper level, which represents an MPN of coliform organisms of 5,000 per 100 milliliters, represents the objective adopted by the Missouri Basin Health Council through its committee of sanitary engineers on water quality objectives. This represents an average of 5,000 per 100 milliliters and should not be exceeded for water used as source of water supplies and for general recreation, such as swimming--I mean such as boating and other types of recreation in which there is not too direct contact of the body of the person with the water. The lower level, which represents an average of 1,000 coliform organisms per 100 milliliters, is the objective established by the same Missouri Basin Health Council as the upper limit for water suitable for swimming.

Q. Suitable from what aspect?

A. From the health, standpoint of health.

Q. Do the levels of pollution shown on Government Exhibits 24 and 25 compare favorably with those levels?

A. No, they do not.

Q. Can you tell us just how they do compare?

A. Yes. Using Government Exhibit 25, above St. Joseph the average MPN for warm weather months was found to be 36,000 per 100 milliliters, which is a little greater than 7 times the objective for water supply and general recreation and is some 36 times the level for swimming.

Opposite the Atchison water intake the MPN level was 50,900, or a little greater than 10 times the objective for water supply and general recreation and 51 times the objective for swimming.

At the peak of the curve (indicating), which is about 10 miles below Atchison, the level of coliform organisms was computed to be 64,300, or a little less than 13 times the objective for municipal--or domestic water supply and general recreation or 64 times the objective for swimming.

At the Leavenworth intake, the most probable numbers of coliform organisms was 40,400, or a little greater than 8 times the objective for source of water supply and general recreation and 40 times the objective for swimming.

At the Kansas City, Kansas, water works intake the coliform organism level was 47,900, or a little less than 10 times the objective for the source of water supply and for general recreation and about 48 times the level for swimming.

Q. Mr. Kittrell, in your opinion, is the degree of the health hazard proportionate to the extent to which the level of contamination actually found exceeds the recommended objectives?

A. Yes, in a general way I would say so, sir.

Q. Why?

A. Because as the level of coliform organisms associated with sewage pollution increases the probability of the presence of pathogens increases in rough proportion to the level of coliform organisms.

MR. EDELMAN: At this time I offer Government Exhibit No. 24 and Government Exhibit No. 25 in evidence as separate exhibits.

MR. SCHOENLAUB: No objection.

MR. BROWN: No objection.

CHAIRMAN SAMSON: There being no objections, they will be received in evidence.

(Government's Exhibit No. 24 and Government's Exhibit No. 25 received in evidence.)

Q. (By Mr. Edelman.) Mr. Kittrell, based on your studies, investigations and knowledge of the situation, have you been able to compute the portion of the pollution load encountered at downstream cities that is attributable to St. Joseph, Missouri?

A. Yes, I have computed such figures.

Q. Have you prepared a chart showing the computation?

A. Yes, I have, showing the results of the computation.

MR. EDELMAN: I ask that this chart be marked as Government Exhibit No. 28 for identification.

(Government's Exhibit No. 28 marked for identification.)

MR. EDELMAN: The chart is entitled "St. Joseph, Missouri to Kansas City, Kansas Computed Sources of Contamination."

Q. (By Mr. Edelman.) Will you tell us very briefly what that chart represents and the scale to which it is drawn?

A. Well, along the left-hand margin (indicating) is a scale representing the level of coliform organisms. This scale is in terms of--well, starting at the 10 figure, this represents 10,000 coliform organisms per 100 milliliters, and the scale goes on up to a maximum of 90,000 coliform organisms per 100 milliliters.

Q. Have you identified the four communities, that is St. Joseph, Atchison, Leavenworth, and Kansas City, Kansas, by different colors on the chart?

A. Except that we are not dealing with the Kansas City wastes, and so that is not included here. I have identified the coliform organisms from upstream above St. Joseph by the red color, those from the St. Joseph area by the yellow color, those from Atchison, Kansas, by the blue, and those from the Leavenworth area by green.

Q. Will you tell us what you determined?

A. Of course at the St. Joseph water plant intake all of the coliform organisms were from upstream above that point. At the intake, as I previously stated, the coliform level was 36,000 per 100 milliliters. At the Atchison intake I have computed that of the total of 50,900, 23,900 or 47 percent, were contributed by St. Joseph pollution. At the peak of the curve, which totals 64,300, I have computed that St. Joseph contributes 34,000, or 52.9 percent of the total, represented by the red portion of the bar (indicating). I am sorry. I am sorry, I am getting my colors mixed up. Represented by the yellow portion of the bar (indicating).

At the Leavenworth intake I have computed that of the total of 40,400 St. Joseph contamination contributes 21,400, or 53 percent of the total.

At the Kansas City, Kansas, intake I have computed that the St. Joseph pollution contributes 14,400, or 30.1 percent of the total 47,900.

Q. Now, Mr. Kittrell, that chart, although you did not mention it, also shows the pollution loading contributed by Atchison and Leavenworth, does it not?

A. That is correct, yes.

Q. Will you tell us on what basis you made this computation?

A. Well, in order to do that I will have to go back to the Exhibit No. 25 and the combination of curves on this chart represents the method that I used in making the computations. Starting at St. Joseph, I have drawn a yellow-dashed curve (indicating), which indicates the normal die-away of coliform organisms from above St. Joe which would be expected in the absence of contamination from St. Joseph and Atchison. And until an additional source of contamination is received, then I have computed that the difference between the level of the yellow line at a given point and the level of the red line represents the contribution by St. Joseph.

Q. In other words, you subtracted the number--

A. The residual from upstream.

Q. From the actual number?

A. From the total observation. And in general the same principle was followed at successive--below successive sources of pollution, except that it is a little more complex downstream. In general I have drawn lines showing either the actual death rate as indicated by the total observations or the computed death rate indicated for other sources of contamination.

MR. EDELMAN: The Government offers Exhibit for identification No. 28 in evidence.

MR. SCHOENLAUB: No objection.

MR. BROWN: No objection.

CHAIRMAN SAMSON: There being no objection, the exhibit will be received.

(Government's Exhibit No. 28 received in evidence.)

Q. (By Mr. Edelman.) Mr. Kittrell, Government Exhibits Nos. 24 and 25 deal with warm weather conditions on the Missouri River, do they not?

A. That is correct.

Q. Your study included a period of winter observation, did it not?

A. Yes, I previously referred to that as a study made by our Regional Office in cooperation with folks from the Robert A. Taft Sanitary Engineering Center. That was made in January and February 1958.

Q. Now, in connection with the results of that study have you prepared a chart?

A. I have.

Q. May I have it?

MR. EDELMAN: I ask that chart entitled "St. Joseph, Missouri to Kansas City, Kansas Bacterial Contamination of River Winter Conditions" be marked as Government Exhibit for Identification No. 29.

(Government's Exhibit No. 29 marked for identification.)

Q. (By Mr. Edelman.) Now, as a result of the sampling you did during this period of study and the examination made of the samples, did you arrive at levels of coliform density at various water plant intakes?

A. Yes, I did.

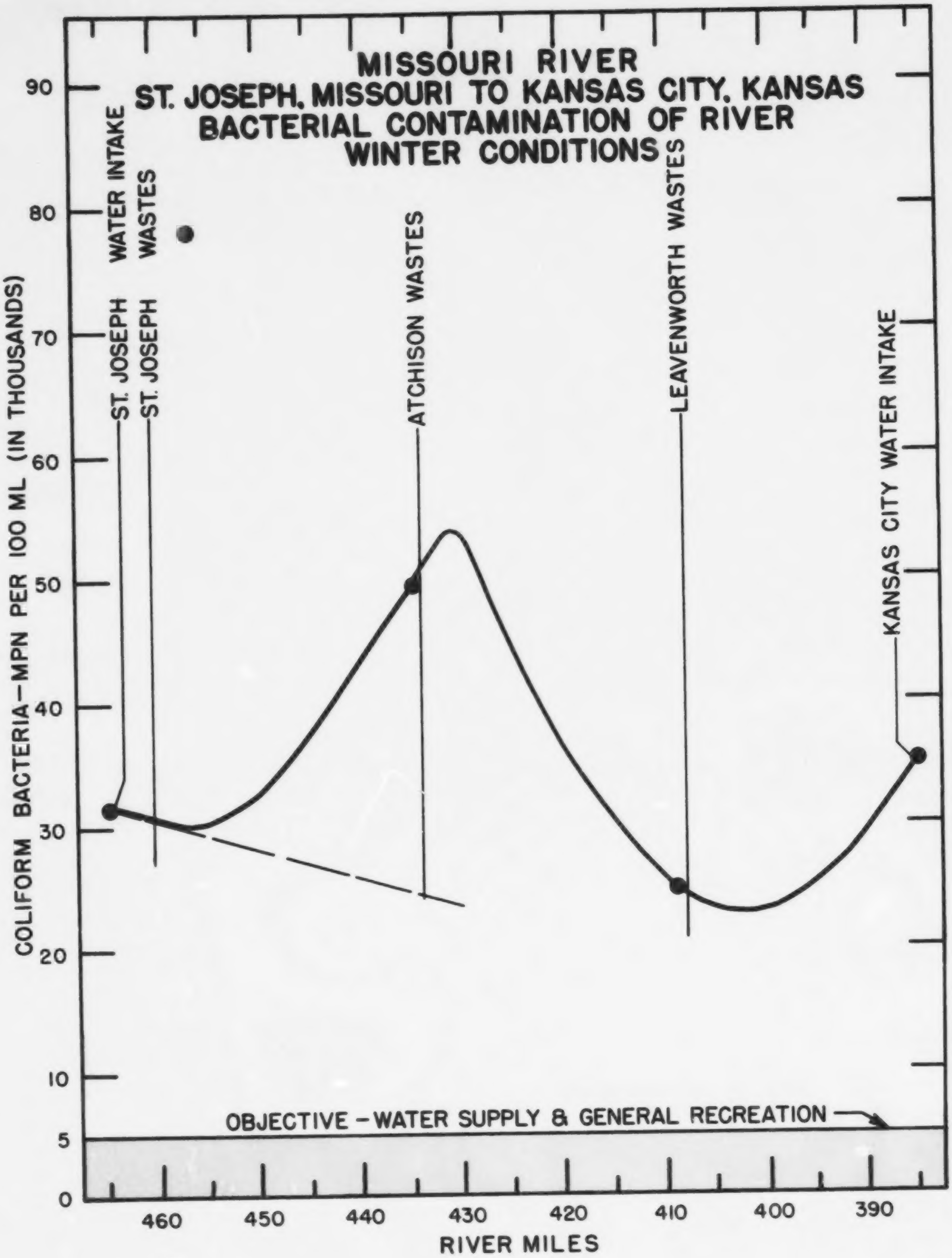
Q. Will you please tell us what these levels were?

A. Well, actually they were quite similar to the levels we found during the summer, and I might read both values to show how they compare. At the St. Joseph intake during warm weather the coliform level was 36,000 per 100 milliliters. I am sorry. I need Exhibit 25 back.

MR. EDELMAN: Let the record show the witness is now referring to Government Exhibit No. 25.

A. On Government Exhibit No. 25 the value above St. Joseph in warm weather was 36,000 per 100 milliliters. On Government Exhibit 29 the level shown above St. Joseph for winter conditions is 31,200.

244.A



MISSOURI RIVER
ST. JOSEPH, MISSOURI TO KANSAS CITY, KANSAS
BACTERIAL CONTAMINATION OF RIVER
WINTER CONDITIONS

At Atchison, the warm weather level was 59,900, and during the cold weather period the level was 48,800.

At the peak of the curve below Atchison in warm weather the level was 64,300, at the computed peak of the curve below Atchison in cold weather the level was 53,000.

At the Leavenworth intake in warm weather the level was 40,400, and in cold weather it was 24,500.

At the Kansas City intake in warm weather the level was 47,900, and in cold weather 34,900.

Q. (By Mr. Edelman.) Now, these levels that you are referring to are water plant intake levels, are they not?

A. All except the peak of the curve, which is a computed value.

Q. And this is the level that the water plant operators at those stations have to deal with?

A. That is correct.

CHAIRMAN SAMSON: Mr. Edelman, I notice that the hour of 12 has arrived. I wonder if this might not be a good time to take a noon recess. Would it be agreeable with you gentlemen to reconvene?

MR. EDELMAN: Mr. Chairman, if I can finish with this witness in one or two questions, it may help Mr. Brown during the noon recess.

CHAIRMAN SAMSON: Well, very well.

MR. BROWN: It is neither going to help nor hurt. I don't care.

MR. EDELMAN: That is fine. We are at the disposal of the Chair.

CHAIRMAN SAMSON: What do you have, just one or two more questions?

MR. EDELMAN: One or two more questions.

CHAIRMAN SAMSON: I don't mean to limit you now. Whatever your pleasure is.

MR. EDELMAN: If we may, we would just like to finish at this point.

CHAIRMAN SAMSON: Very well. Proceed.

Q. (By Mr. Edelman.) Now, I direct your attention to the Government Exhibit No. 25 and Government Exhibit for Identification No. 29 and ask you whether on the basis of your experience, your knowledge and your personal participation in this survey you can tell us the significance of this level of bacterial pollution with respect to the use of the river as a water source?

A. Well, the high levels of coliform organisms shown indicate a very definite probability of associated pathogenic organisms which do constitute a potential hazard to health.

Q. Do you consider that this level of pollution constitutes a hazard to the health of all individuals who come into direct contact with raw river water in the use of the river in activities such as boating, fishing, bathing, or navigation?

A. Very definitely.

MR. BROWN: Just a moment. Did you say winter?

MR. EDELMAN: I said in direct contact with raw river water?

MR. BROWN: You are talking about the use in the winter? I object to that, because the river is frozen over here in the winter. There is no boating.

CHAIRMAN SAMSON: Mr. Brown, I don't believe there was anything said about winter in my hearing.

MR. BROWN: I thought he was comparing it with the winter. If he is--

MR. EDELMAN: Mr. Brown, if people come in contact with the water in the winter, I would like his opinion.

MR. BROWN: Well, but you said by boating, swimming, et cetera. Now, there is no boating here, there is no navigation, everything is tied up in navigation, there is no recreational use. Unless you can show there is such use, why, I object to the question. That is not a fair question.

MR. EDELMAN: Then I will have another question.

Q. (By Mr. Edelman.) Let's limit this question to uses during the period when the river is not frozen, Mr. Kittrell.

A. Very definitely.

Q. Can you tell me whether an individual who comes into contact with raw river water during the winter would be exposed to this hazard?

A. If he came in contact with the water during the winter he would.

MR. EDELMAN: We have completed at this time, Mr. Chairman.

Just may I complete this? We would like to enter Government Exhibit No. 29 in evidence at this time.

MR. SCHOENLAUB: No objection.

MR. BROWN: I have no objection.

CHAIRMAN SAMSON: There being no objection, it will be received.

(Government's Exhibit No. 29 received in evidence.)

MR. AYERS: Mr. Chairman, I received in the mail this morning from Mr. Max Wasserman in Kansas City, the attorney representing the Consumers Cooperative, an affidavit from him pursuant to your agreement with him on Monday, I believe, and I am asked to present this to you and to counsel and if it is not admitted he would like to have me call him by at least 4 o'clock.

CHAIRMAN SAMSON: Very well.

MR. AYERS: May I present copies of this to them at this time?

CHAIRMAN SAMSON: Would you present to interested counsel copies.

MR. EDELMAN: Does the Chair wish to rule on this now or after lunch?

CHAIRMAN SAMSON: No, the Chair will reserve ruling on it and you gentlemen may study it at your pleasure during the lunch hour.

Would you mark, then, the original as Consumers' Exhibit No. 1?

(Consumers' Exhibit No. 1 marked for identification.)

CHAIRMAN SAMSON: Gentlemen, we will now stand adjourned until--will it be agreeable to come back at 1:30, Mr. Brown, Mr. Schoenlaub?

MR. BROWN: Yes, sir.

MR. SCHOENLAUB: Yes, sir.

MR. STEIN: Yes, sir.

CHAIRMAN SAMSON: Possibly we could work a little later this evening, a little after 5, to suit your convenience.

We stand adjourned, then, until 1:30.

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WHEREUPON, the hearing stood at noon recess until the hour of 1:30 o'clock in the afternoon, at which time the following further proceedings were had and entered of record, to wit:

- - - - -

## AFTERNOON SESSION, WEDNESDAY, JULY 29, 1959

CHAIRMAN SAMSON: The hearing is in order.

There was an exhibit submitted just before the noon recess from one of the parties defendant here.

SECRETARY AYERS: Yes, the Consumers Cooperative Association.

CHAIRMAN SAMSON: I understand that counsel have been supplied with copies of this exhibit, which is referred to as Exhibit 1 of Consumers Cooperative Association. What remarks have counsel to make in connection with this exhibit for the Government?

MR. STEIN: No objection.

CHAIRMAN SAMSON: Mr. Brown?

MR. BROWN: We have no objection.

CHAIRMAN SAMSON: Mr. Schoenlaub?

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: Any remarks from any of the other interested parties?

It will be received, then.

(Consumers Cooperative Association
Exhibit No. 1 received in evidence.)

CHAIRMAN SAMSON: And would you advise Mr. Wasserman in Kansas City that it has been received in evidence?

SECRETARY AYERS: I will.

CHAIRMAN SAMSON: Thank you.

You may proceed.

MR. BROWN: Mr. Kittrell was on the stand.

CHAIRMAN SAMSON: I believe that is right, Mr. Brown.

Is the Government now through with Mr. Kittrell as their witness on direct examination?

MR. EDELMAN: Yes.

CHAIRMAN SAMSON: Do the State of Kansas or the State of Missouri have any cross-examination?

There being none, what about the political subdivision of the City of St. Joseph, Missouri?

MR. SCHOENLAUB: I have one or two questions, your Honor.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Referring to Exhibit 25, is that the exhibit directly behind you, Mr. Kittrell?

A. Yes, that is correct.

Q. And that shows the contamination level of the Missouri River from the St. Joseph Water Company intake tubes downstream, is that correct?

A. Based on the data that we obtained, yes.

Q. And the shaded red line at the bottom (indicating)? Yes. That is the contamination level or that is what would be the contamination level if the City of St. Joseph were not contributing sewage to the river?

A. Down to this point (indicating), yes.

Q. Down to the point where it breaks --

A. Yes.

Q. -- sharply downward. Will you state whether or not without the pollution allegedly occurring at the City of St. Joseph the water, according to your charts, would be safe for general recreational and water source uses?

A. I am not sure I got your question fully. I didn't quite hear one or two words.

MR. SCHOENLAUB: Will you read it, please?

(Question read.)

A. At what point are you referring to?

Q. (By Mr. Schoenlaub.) At any point below the City of St. Joseph, shown on your chart.

A. No, I would not say that it would be safe.

Q. Now, you go as far north as the City of St. Joseph. Do you have any data on the contamination level of the river on north of the City of St. Joseph?

A. We have some data, yes.

Q. Do you have that with you?

A. No, I did not bring that with me.

Q. The line on your chart drops steadily from St. Joseph downstream. Going north on the chart, would it rise at approximately the same rate?

A. You are referring to this line (indicating)?

Q. Yes.

A. It would for some miles upstream, yes.

Q. And to what point, if you can recall, would that rise stop?

A. Well, at the same rate, you asked about the same rate, I couldn't say at the same rate just where that would stop. At the moment I don't have the data with me.

Q. But at the St. Joseph water intake tubes, which are above the St. Joseph sewer outlets, there is approximately seven times the contamination as would be safe for general recreational and water source uses?

A. That is approximately seven times the objective, yes.

Q. And that is before the river reaches the St. Joseph sewer outlets?

A. That is correct.

Q. So that even if St. Joseph were to treat their sewage as requested by the Public Health Service, the water still would not be safe for any of the purposes mentioned?

A. Not until sewage treatment is installed upstream also.

MR. SCHOENLAUB: I believe that is all.

MR. EDELMAN: Might I have the answer repeated, the question and answer, please?

(Record read.)

CHAIRMAN SAMSON: Mr. Brown?

MR. BROWN: Yes, sir.

CROSS-EXAMINATION

BY MR. BROWN:

Q. Go a little gently here. I've got a high regard for your ability here, sir.

A. The same to you.

Q. This Exhibit 25, there is something on that that I don't understand. You show this (indicating) as the coliform content.

A. The coliform MPN.

Q. All right. It is about 37,000 at the waterworks intake north of St. Joseph.

A. The figure was 36,000, yes.

Q. Well. And then you went to a point here (indicating) that was below the sewers or in St. Joseph it was -- well, then, it would be mile -- if this (indicating) is, oh, 464, that is down to 440 something. In other words, it is several miles, 8, 10, 12 miles downstream from St. Joe. It had jumped up to a little less than 50,000. I am just asking in generalities; I don't care for the exact figure.

A. Well, this (indicating) is not the measured value, as you recall. This is adjusted value.

Q. Oh, that is your adjusted value?

A. Yes.

Q. Then shortly below that the adjusted value dropped way down?

A. That is correct.

Q. And then at Atchison before you reach the Atchison sewer supply it jumped way up?

A. Yes.

Q. Now, I don't understand that. Would you explain that to me?

A. Well, I believe I --

MR. EDELMAN: May I -- I am not sure what counsel wants explained.

MR. BROWN: I think the doctor understands it. If he doesn't, I will reask it.

MR. EDELMAN: Maybe his answer will explain it to me.

A. Repeat your question.

Q. (By Mr. Brown.) What I said was this, you have taken four points, one point north of St. Joseph and from there to a point some 10, 15 miles below St. Joseph it jumps up, then in a very short distance, perhaps another 3 miles, it goes way down, then before it reaches Atchison, which theoretically is the next source of pollution, it jumps way up. Now, I was asking for an explanation. Is that because of an incubation period or what?

A. Well, at this point (indicating) our results revealed, this sampling at quarter points across the river, that we were not far enough below town for complete mixing of the sewage across the river and therefore I do not consider this point (indicating) a true representation of the rate at which the bacteria increased below St. Joseph.

Q. All right, sir. Now, in obtaining your data to make these computations of yours, calculations, you, I assume, checked the number of sewer users in St. Joseph and you arrived on some formula which is standard in your industry or profession that so many users would produce a given amount of municipal waste?

A. That is correct.

Q. In other words, you did not go below each outfall and take an exact sample there and see how much more had been introduced by that particular outfall?

A. No.

Q. The reason I ask that, the two lower outfalls, lowest in the city, which are referred to as the stockyards or industrial sewers, also contain and take care of a great deal of sewage discharged from sewer users down there. Now, by the same token, in determining the amount of waste introduced into the river by the industries what figures did you use?

A. Well, I based my computation of the coliform concentrations from the stockyards on the live weight killed at the stockyards during the period that we sampled and on the number of coliforms that we had found in studying other -- wastes from other stockyards.

Q. Well, the number of coliforms would depend to some degree upon the cleaning methods used in the various plants themselves, wouldn't it?

A. That is true, yes.

Q. And I assume you have the '55 and '59 Black and Veatch reports which are Exhibits 5 -- one of them is 5; I have forgotten the number of the other -- '55 is 4 and the '59 is 5?

A. I can't recall the exact report that I read. I have read some of the Black and Veatch reports, yes.

Q. The last Black and Veatch report indicated that material reductions had been made by a number of those industries?

A. That is correct.

Q. And that further steps were in progress. Assuming that they have made material reduction and are continuing to do that, then that, of course, would reduce your estimates?

A. Not in this case, no.

Q. Wouldn't reduce it at all?

A. No.

Q. Well, let's take a concrete example. Let's take the St. Joseph Stock Yards Company, which formerly --

A. I am sorry, maybe I misunderstood your question.

Q. Well, I --

A. I may not have given you the answer that I should have. Do you want to try it again?

Q. All right, I will reask it. I say if these industries have between 1955 and the date of this hearing and they are still reducing the material introduced by them into the Missouri River, then there would be a reduction in the figures of the coliform content you attribute to them?

A. At what time would this reduction occur? That is where I think I misunderstood.

Q. Well, the reduction is occurring constantly, they are constantly -- for instance, I can give you one set of figures. The St. Joseph Stock Yards Company, which is the hotel for this livestock, the pens and all that, you understand.

A. Yes.

Q. In the year beginning July 1, '58, and ending June 30, '59, they dry cleaned their pends instead of washing them, washing the fecal matter and all of the waste down into the stream, and they shipped out in cars some 25,000 tons of material which formerly went into the river. Now, that would make a great difference, wouldn't it?

A. I would say it should reduce the coliform content from what it was before this operation started, yes.

Q. All right, sir. And if the other plants down there have made -- I can't say that they have all made the same percentage of reduction, but if they all have made reductions and are continuing to reduce, then there would be a lessening of the coliform count attributable to them?

A. Since the operation started, yes.

Q. All right, sir. So you can't say with a reasonable certainty that the calculations you made accurately depict what these industries are doing at the present time?

A. I think I can.

Q. You think you can?

A. Yes.

Q. Suppose there has been a reduction since you made your count?

A. Well, I couldn't account for that at this time.

Q. Well, that is all I am saying.

A. If it had been reduced since I did this work, that is correct.

Q. All right. Now, there is another question I wanted to ask you, Doctor. You made some investigation of the Platte River, I believe you said it drained some 22 or 23 hundred miles of the total of 29 hundred miles --

A. About 24 hundred.

Q. -- roughly that empties into the Missouri between St. Joseph and Kansas City, Kansas. Did you actually determine the coliform count in the Platte River before it emptied into the Missouri?

A. Yes.

Q. Do you know what that coliform count was?

A. I have it in my records.

Q. May I have it, please?

A. Well, now, on what basis are you asking for that?

Q. Well, all of the data that you have on --

A. You want me to read all 20 results?

Q. If you have summarized, I don't want to prolong it, but if you can summarize it very briefly, I would like to know what it is.

A. It may take me a minute to find my figures here.

I am sorry, I thought I had my data organized better than this. I have it here somewhere.

For the dates that we sampled the main river and had information for the Platte, the average MPN near the mouth of the Platte was 12,200 per hundred milliliters.

Q. Now, 12,000 per hundred milliliters, that is well above the line set in the lower part of Exhibit 25, the one represented by the top of the yellowed area, which is -- what is that now in there?

A. I am not sure I know what point you are referring to.

Q. Well, here. You have one limit where it is safe for water supply in general, you have 5,000.

A. Oh.

Q. So the Platte River was better than double that, the contents?

A. Double the level of the objective.

Q. Yes, double the level.

A. Yes.

Q. And you have what, 1,000 for swimming purposes?

A. Yes.

Q. So the Platte River was 12 times more dangerous for swimming. And I believe you told the Board that when the Platte River emptied into the Missouri it lessened the dilution of the Missouri?

A. It lessened --

Q. Which, of course, is obvious.

A. Not the dilution.

Q. I mean it lessened the coliform count?

A. Yes.

Q. You take two bottles of the same solution, but one is stronger or lesser and mix them together, the stronger one is diminished and the lesser one is made stronger. Now, the point I am trying to make is this: If the Missouri River count was down to 1,000 and you poured the Platte River in there with 12,000, you are going to bring that 1,000 count up?

A. Yes.

Q. So unless you clear up the Platte you are still going to have pollution from the Platte River?

A. That is correct.

Q. And the same logically would hold true for all of the tributaries that enter into the Missouri River?

A. Not unless they had the same level that the Platte had.

Q. Well, whatever degree of pollution they contribute, you would agree, would you not, that practically all the tributaries carry some pollution?

A. We found MPN in all of the tributaries that we sampled.

Q. So you are never going to clean up the Missouri River until the tributaries also are cleaned up?

CHAIRMAN SAMSON: Mr. Kittrell, would you speak up so that we can all hear you? Thank you.

A. Well, the answer to your question comes down to a matter of dilution.

Q. (By Mr. Brown.) Yes.

A. If the Missouri River is clean enough in relation to -- and the flow is maintained at present levels in relation to the relative small flows in the tributaries, the tributaries in dry weather flow would have relative little impact on the MPN of the main river.

Q. Well, of course that would depend upon the size of the tributary?

A. That is correct.

Q. Now, when you take the entire Missouri River, without going up to Three Forks, but starting with the Heart at Mandan and coming down, the Platte in Nebraska and the Chariton and the Grand River in Missouri and the Kaw coming in from Kansas, you have some large tributaries flowing into the Missouri River, that is right, isn't it? And as long as they carry pollution they are very materially going to affect the pollution carried in the main stem of the river?

A. I couldn't say from my own knowledge it would do it materially.

Q. Well, now, let me ask you one more line of questions and we will quit. Your last exhibit, 28 -- or 29, was the chart of contamination in the winter. Now, you showed the coliform count as something less than in the summer.

A. Yes.

Q. But not, as you said, significantly less.

A. That is correct.

Q. Now, I don't understand, that is the reason I am asking you this, there must be a reason for it or an explanation, in the winter, according to the testimony that has been given here, the average flow of the river is perhaps one-sixth of what it normally is in the summer months.

A. That was not my understanding.

Q. I thought they got it down to 5,000 at one time as compared to around 31,000.

A. Well, --

Q. But I could be wrong. I don't have the figures in my mind. But, at any rate, it is common knowledge that the flow of the river in the winter is much less than it is in the summer.

A. Yes.

Q. Now, if the flow was much less, I assume, and if I am incorrect you correct me, I assume that the sewage tossed into the river by a population is essentially the same winter and summer.

A. And in referring to sewage you are speaking of --

Q. I am talking of municipal wastes there.

A. Well, the sewage itself, yes, is essentially the same.

Q. Now, the industrial waste in this area, we have very few seasonal industries. We did have some chicken industries prior to '57 that are no longer here that were seasonal. Our other industries run the year round. If the industries and the City are contributing essentially the same amount of pollution in the winter that they do in the summer when there is a smaller flow, why is the coliform count less in the winter? Now, I don't know. I am just asking.

A. Well, the reason for that is indicated by the nature of this curve (indicating). As you see, there is an increase after the introduction of sewage bacteria containing waste into the river. In the summer this commonly grows to a certain definite level, depending on how much sewage and how much flow. In the winter there is not the same amount of regrowth.

MR. BROWN: I see. All right, that answers my question. Thank you very much. That is all.

CHAIRMAN SAMSON: Any questions by any members of the Board?

Doctor, do you have?

DR. MARTIN: No.

CHAIRMAN SAMSON: Mr. Poole?

MR. POOLE: I have one.

Q. (By Mr. Poole.) Can you go back to Exhibit 22? Or maybe I can ask mine without you getting the exhibit. I must have it wrong or copied it from you -- no, I guess I didn't. I have in my notes an equivalent population from the St. Joe sewers of a hundred fifty-nine thousand and from the packing and stockyards district of four hundred eighty-five thousand, or a total of six hundred forty-three thousand.

A. That is correct.

Q. My question is, now, I haven't studied Exhibit 5 as yet, are those figures taken from the Black and Veatch report or are those independent results as a part of your survey?

A. Those were obtained by Herb Clare in his study of the waste sources in St. Joseph.

Q. Well, then, that is probably the answer to my next question, where I had an equivalent population of thirty-three thousand for Atchison, Kansas, and I heard this morning that the actual population was about thirteen thousand, I believe.

A. I believe that thirty-three thousand figure includes industrial waste population equivalent.

MR. POOLE: That is all.

CHAIRMAN SAMSON: Mr. Johnson?

MR. JOHNSON: No questions.

CHAIRMAN SAMSON: Mr. Kurylo?

MR. KURYLO: No questions.

CHAIRMAN SAMSON: I have a question or two, Doctor.

Q. (By Chairman Samson.) Your investigation covered relatively three periods of time, they being in January of '58, September of '58, April and May in 1959, is that right?

A. That is correct.

Q. Did your investigations during any of those times of the conditions of the Missouri River bring into focus for you any other pathogenic organisms besides these that you have testified to?

A. I am not sure I understand what you mean by "bring into focus any other pathogenic organisms".

Q. Well, did you check on any other bacteria, any other pathogenic organisms in the river?

A. Well, as I explained earlier in describing this survey, we did make determinations of streptococci and of fecal coliforms, and Mr. Clark is to testify to these data. Those are the only examinations that we made for bacteria, those three.

Q. Can you tell this Board from your own personal knowledge whether or not if there are coliforms present in the water associated pathogens would also be in that water?

A. It is almost inevitable that either they are present at any given time or that they will be at some time. There are a great many carriers of pathogenic carrier organisms, typhoid, and so forth, and it is inevitable, especially in a large population, that at times pathogens will be associated with the coliform organisms.

Q. Well, then, if I inquire about viruses, is that a little out of your field?

A. It is, yes. But I might offer an opinion, that I think the same would hold true with respect to the viruses.

Q. That they would be present if there is a relatively high coliform count in the river, is that right?

A. Yes.

Q. Now, does the velocity of the water have any bearing at all on your experiments and your tests?

A. Well, in what way do you mean?

Q. I mean would it cause a variation in your end result?

A. Insofar as velocity effect upon the bacteria themselves, there would be none in the ranges of velocities we are dealing with.

Q. Very well. Now, in setting up these sampling stations as you have testified to, I believe you testified you ran checks every three hours at some of these stations, is that right? Would you just relate to the Board the mechanics of that test; that is, do you take the test all the way across the river at the various levels from the bottom of the stream on up or just how do you do that?

A. For the sampling every three hours we sampled -- we took only one sample each three hours at each intake. That sample was taken at three of the locations, three of the intakes, from taps which were located very near the point where the water was pumped from the river, located on pipe lines where the water was passing from the river. At one station, at Leavenworth, we couldn't find such a suitable tap so we sampled by dropping a bottle on a string over the side of the intake structure from a platform. When we sampled by boat, then we did sample at each quarter point of the river. Those samples were collected by scooping the sterile bacteriological bottle about 6 to 8 inches below the surface with the mouth facing upstream. We did not sample at any greater distance below the surface than this. This river is an extremely fast river and it is well mixed from top to bottom.

Q. I have just one more question. That is, generally would you relate to the Board or explain to the Board the reason for the upward curve in the coliform count as portrayed on these exhibits that you have been testifying about?

A. Well, this is characteristic of all streams where sewage is introduced that there is an increase in the coliform level from a point immediately below the point of discharge to some distance downstream, and this is attributed to the multiplication of bacteria after they enter the stream from the sewers. In other words, they continue to grow for a while and to multiply for a while after they enter the stream.

Q. Well, then, would it be fair to say that the peak of the curve would vary in accordance with the velocity of the water and the temperature of the water and the degree of pollution? Are those the controlling factors on determining where the actual peak of the coliform count is.

A. Well, let's take those one at a time, please.

Q. Very well.

A. That is a little bit too many to give a single answer to now.

Q. I am sorry.

A. Would you repeat which ones you want to take up one at a time?

Q. What factors determine just where the peak of the coliform count is?

A. Well, velocity is one. The peak of the curve frequently occurs in a time of travel distance below the source of some 12 to 15 hours after the sewage enters, the peak frequently occurs in 12 to 15 hours' time as water passes downstream. The level to which the peak rises in the summertime, shall we say, is dependent on summer temperatures and on the dilution afforded for a given amount of sewage. In the wintertime, of course, the temperatures are lower and the peak will be somewhat lower if you have the same dilution that you have in the summer.

Q. And further away from the point where the pollution enters the river?

A. That is correct.

CHAIRMAN SAMSON: I have no further questions.

MR. JOHNSON: I have one.

CHAIRMAN SAMSON: Mr. Johnson.

Q. (By Mr. Johnson.) Will you tell me, please, just to clarify it in my own mind, are these charts and the things you have been telling us the result of your last survey or is it a combination of all three of the surveys mentioned?

A. The black points, which are the intake samples, are all the result of four days of continuous sampling at three-hour intervals at those four points during the last survey.

Q. Yes.

MR. EDELMAN: That is Government Exhibit 25 you are referring to?

A. That is correct. The boat sample results are a combination of five days of boat sampling during the last survey, two days of the boat sampling in September of 1958, at which time the temperature in the river was somewhat comparable. The winter curve, which is Government Exhibit 29, is based entirely on data obtained in January and February, 1958.

MR. JOHNSON: Thank you.

CHAIRMAN SAMSON: Mr. Kurylo?

MR. KURYLO: Yes, I have several questions.

Q. (By Mr. Kurylo.) In connection with the rise in the number of coliform, could you say that the coliform are fed by or that their growth is attributable to the presence of human feces upon which they feed?

A. This certainly is a factor, yes.

Q. How about industrial wastes?

A. Organic industrial wastes also would furnish nutrition for the bacteria.

Q. Then if the settleable solids could be eliminated from the flow, would that tend to reduce the rate of growth of the coliforms?

A. I do not know that it would affect the rate. I can't answer from my own knowledge.

Q. A few other questions. If you are in a position to answer this question, what type of sewage treatment would you suggest be installed here at St. Joe to remedy the situation which you have indicated in the evidence you presented?

A. Well, I haven't attempted any calculations to indicate what degree of sewage treatment should be installed. And without calculations I would hesitate to answer that.

MR. KURYLO: No further questions.

CHAIRMAN SAMSON: Mr. Poole.

Q. (By Mr. Poole.) I want to come back to Exhibit 22 to clear up one more point. Am I correct in my thinking that as of this time Kansas State Prison is the only installation on Exhibit 22 that provides treatment of its sewage?

A. That is correct.

DR. MARTIN: Mr. Chairman.

CHAIRMAN SAMSON: Yes.

DR. MARTIN: I have one question, if I may.

Q. (By Dr. Martin.) Mr. Kittrell, I think you may have covered this in your testimony, but can you give us the particular date on which the material in Exhibit 29, I believe it is, and Exhibit 22 and the companion exhibit to 22, which I think is 23, the date for which the particular exhibit is accurate in the best of your opinion?

A. This (indicating) is one of the exhibits you are referring to, 22?

Q. Yes.

A. The data for St. Joe are quite recent. Mr. Herbert Clare made this survey and they are quite recent. The data -- and this refers to the organic waste load, this chart -- the data for the sewered populations, which are a portion of the total organic load, are quite recent. They were obtained during our April and May survey. The industrial portion of the load at the other towns were obtained from the official water works -- I mean, I am sorry -- official sewage and industrial waste inventory of the Public Health Service and I believe the latest copy of that I had was about 1957. And I believe that covers the dates of the information on this chart.

Now, what was the next chart? You said 23, I believe.

Q. 23, I believe, a very similar chart.

SECRETARY AYERS: 23 is the sample.

Q. (By Dr. Martin.) I am sorry, I believe it would be the sources of coliform content.

A. I believe that is 21.

Q. 21.

A. Yes, this is 21. Well, essentially the same dates apply here, except I have already described the St. Joe contribution as of a recent survey by Mr. Clare and these are sewered populations as of the date of our work in April and May. Now, was there a third?

Q. The third was 29, the percentage contribution of bacterial contamination to the river.

A. That is 28.

Q. 28.

A. I believe this (indicating) is the one that you referred to.

Q. Yes.

A. Well, this is based on the combination of all the work that we did in the warm weather period.

DR. MARTIN: Thank you. That answers my question.

CHAIRMAN SAMSON: Any further cross-examination?

MR. BROWN: I have one question, Doctor, I neglected to ask.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. In computing the sewered population, how do you or what factor or percentage do you attribute to industries which are located within the city limits and use the municipal sewers?

A. I am not sure I --

Q. Well, let's take a concrete example. We have inside the city limits two packing plants in addition to the packing plants in the industrial area. One of them is quite large and kills a large number of cattle daily. Now, how do you determine how much of this organic waste comes from that plant?

A. My figures are based on Mr. Clare's review of the sources of waste in St. Joseph.

MR. BROWN: I see. That is all. Thank you.

CHAIRMAN SAMSON: Any further redirect, gentlemen?

## REDIRECT EXAMINATION

BY MR. EDELMAN:

Q. In determining sewered population, Mr. Kittrell, you just determine what the sewered population is, you don't take any center into account, do you?

A. For the sewered population --

Q. That is right.

A. -- with the exception of the coliform contributions from industries which produce coliform such as the packing plants here, then we considered them in terms of equivalent sewered population.

Q. There has been some mention of flow time and velocity. As part of your study did you determine the flow time of the Missouri River between St. Joseph and Atchison?

A. Yes.

Q. Will you tell us what your determination showed it to be?

A. Well, the data that we obtained indicated that the velocity of the river during the periods that we were working was around 4 miles per hour. The distance from St. Joe to Atchison is approximately 24 miles. Therefore, the time of water travel was about six hours.

Q. Does this time of water travel have any significance as far as the growth or multiplication of coliform in the river is concerned?

A. I am not sure I understand that question.

Q. Is this considered to be a short time of travel between a water intake station and a sewage outfall?

A. Very definitely. This would be considered very fresh pollution by members of the sanitary engineering profession, yes.

Q. Did you as part of your studies have any -- get any information on the flow in the winter?

A. Yes.

Q. Is the flow time six hours in the winter, too?

A. No, it would be a little less than that because of the lower flow.

Q. And the shorter the flow time the fresher the sewage?

A. That is correct.

Q. Now, in answer to Mr. Kurylo's question about the effect of the removal of organic material on the growth rate of coliform, could you answer the question if it were with respect to the growth of coliform, would the removal of organic material affect the growth of coliform?

A. Well, from my own experience, and I have examined a number of rivers in a similar manner to this, I have not found any substantial difference in the peak to which the coliforms rise in terms of dilution and amount of sewage, and so on. I have found no difference in the per capita contribution measured at the peak, regardless of the dilution of sewage, and so on. I have checked a great number of these and I find that at the peak essentially all of them contribute about four hundred billion coliform organisms per capita per day.

Q. Four hundred billion coliform organisms per individual per day?

A. Per individual, yes.

MR. EDELMAN. That is all.

CHAIRMAN SAMSON: Mr. Kittrell, one more question here.

Q. (By Mr. Poole.) You say the wintertime velocity is greater than the summer?

A. No, that was a misunderstanding if I said that. It is somewhat lower. I believe it to be in the ratio of about 4 miles per hour in the summer, which I think is a good firm figure, and about 3 miles per hour in the winter.

Q. In other words, there is a little greater time in the winter?

A. That is right. I probably misunderstood the question.

MR. POOLE: I might have misunderstood you.

CHAIRMAN SAMSON: Mr. Kittrell, I have just one more question to ask you.

Q. (By Chairman Samson.) That is, taking into consideration that there would be no pollution enter the Missouri River and in accordance with your computations, about at what geographical location would the coliform count downstream be such as to be safe for, oh, water supply and general recreation?

A. You mean --

Q. How far downstream from St. Joe?

A. From St. Joe?...

Q. If there is no further pollution coming into the river after the water leaves St. Joe?

A. I haven't made any such calculation, I am sorry.

Q. I thought you had a line there, for instance on that --

MR. EDELMAN: 25.

Q. (By Chairman Samson.) -- bacterial contamination that points generally downward. That is the exhibit I am talking about. What exhibit is that?

A. This line (indicating) refers to the pollution from above St. Joseph.

MR. STEIN: Is that Exhibit 25, Mr. Kittrell?

A. Yes, this is Exhibit 25. Are you referring to the -- I am afraid I am completely mixed up. This line (indicating) refers to the pollution from upstream. Is that the line that you refer to?

Q. (By Chairman Samson.) That is the line I am referring to, that is right.

A. Well, in the absence of pollution from St. Joe I would believe that this line (indicating) would continue at more nearly the same rate as shown by this curve and just where it would drop below 5,000 I couldn't say at the moment.

CHAIRMAN SAMSON: I see. Very well. Thank you.

A. It would be probably below Kansas City somewhere.

CHAIRMAN SAMSON: Thank you.

MR. EDELMAN: We have another question, Mr. Chairman.

REDIRECT EXAMINATION

BY MR. EDELMAN:

Q. You indicated earlier in answer to the question from, I think, the City's counsel that the level of pollution in this area could be reduced to pretty nearly reach the recreational objective if St. Joseph and the upstream municipalities installed adequate sewage treatment. Am I correct?

A. That is correct.

Q. In other words, if the sewage upstream were effectively treated to remove a substantial amount of solids and coliform and if these municipalities treated their sewage similarly, would the purification effect ever result in bringing this pretty close to the objective for recreation?

A. That is a little hard to answer if you are speaking of the whole section of river involved. Immediately below the outfalls --

Q. Well, down in this area, would it reduce it down in this area?

A. Well, I would say immediately below St. Joseph for a few miles possibly not. For the remainder of the river, I believe that it would, yes.

CHAIRMAN SAMSON: Any further cross-examination?

MR. BROWN: No.

CHAIRMAN SAMSON: Mr. Schoenlaub?

## RECROSS EXAMINATION

BY MR. SCHOENLAUB:

Q. I would like Mr. Kittrell to explain that last statement of his a little more. I didn't quite understand just what your answer was to that.

A. Which question is that?

Q. The very last one, referring to the degree of contamination at the City of St. Joseph in the event the municipalities above St. Joseph did treat their sewage.

A. That is not the way I understood the last question.

MR. EDELMAN: I think the City Counselor may be referring --

Q. (By Mr. Schoenlaub.) Well, in that case I will put that in the form of a question. If the municipalities above the City of St. Joseph subjected their sewage to primary treatment prior to discharging it into the Missouri River, would the level of contamination at St. Joseph be below the 5,000 mark?

A. Well, a great deal would depend on the design and the operation of the primary treatment plant. I mean it is possible to get various levels of reduction depending on how well the plant is designed and how well it is operated.

Q. Assuming the highest type of primary treatment plant, would the pollution or the contamination level at St. Joseph be at a point, say, for general recreation and water supply source?

A. I haven't made any calculation on such a basis. I could not answer that.

Q. In your opinion?

A. Without calculation.

Q. You couldn't venture an opinion on it?

A. I would prefer not to without making some calculations.

Q. Would it be at the swimming level, the 1,000 level?

A. I would rather not make any commitment without an opportunity to make some calculations.

Q. Is there any degree of treatment of municipal sewage upstream from St. Joseph which would bring that level of contamination down to the 1,000 level or for swimming purposes?

A. Well, there again without calculations I would not feel that I am in a position to answer, because I assume you --

Q. In other words, you couldn't tell whether primary treatment of the sewage at St. Joseph, Atchison, Leavenworth, Kansas City, Kansas, and points upstream from St. Joseph would still satisfy the purposes or the purpose of bringing the contamination level down to a point where it would be acceptable for swimming?

A. I think I could compute values that would lead to a reasonable estimate, but I have not done this.

Q. Could you do it here or would it take -- and since the hearing will be extending into tomorrow?

A. I am not sure that I have the data necessary. As I stated earlier, I do not have our data for the river between Omaha and St. Joseph with me.

MR. SCHOENLAUB: I believe that is all.

CHAIRMAN SAMSON: Anything further?

That will be all. Thank you.

(Witness excused.)

MR. STEIN: We have some other witnesses we should like to have sworn in at this time.

CHAIRMAN SAMSON: Very well.

MR. STEIN: Mr. Billups, Mr. Kessler, Mr. Van Horn, Mr. Dierking, and Mr. Metzler.

SECRETARY AYERS: Will those witnesses come forward, please?

(Witnesses sworn.)

MR. STEIN: Mr. Dierking.

O. R. DIERKING,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. STEIN:

Q. Will you state your name and address to the Board, Mr. Dierking?

A. My name is O. R. Dierking. I live at 910 Kansas Avenue in Atchison, Kansas. And what else did you want, sir?

Q. That is all. Of your personal knowledge do you know if there is a boat club in Atchison, Kansas?

A. Yes, sir, I am Commodore of the Atchison Boat Club.

Q. Does this boat club have any facilities at the Atchison, Missouri River water front?

A. Yes, sir. The City has constructed a quite adequate loading ramp for the purpose of loading and unloading boats at the river there and our organization has approximately 15 to 20 boat slips that are placed in the river each spring and left there throughout the summer that we use for loading and unloading and storage of pleasure craft.

Q. About how many boats does this accommodate?

A. Our present facility would accommodate about 18 boats at one time. However, this facility serves approximately 40 boats because they are not all used at the same times.

Q. Are these boats used by families and friends?

A. Families, almost exclusively by families.

Q. Mr. Dierking, when you and the members of your club go boating what is the boat run they generally take?

A. Oh, the Atchison to St. Joe run, I would say, would be the most common. Also organized cruises have been held from Atchison to Rulo, Nebraska, Atchison to Leavenworth, Atchison to Kansas City. Those would be the most common cruises.

Q. Do members of your club water ski?

A. Yes, sir.

Q. Do they swim in the river?

A. As a general rule not. Some swimming is, of course, required when you are water skiing, but I would say the swimmers among our group would be an exception.

Q. Do you own a boat yourself?

A. Yes, sir.

Q. What kind of boat is that?

A. I have a 15-foot Speedliner boat, 35-horse Evinrude motor at the present.

Q. What is the hull made of?

A. My boat is a fiber glass construction, I think insurance companies refer to it as plastic, but it is referred to in boat building as fiber glass.

Q. In using your boat on the St. Joseph-Atchison run have you ever noticed any material accumulating on the hull of your boat?

A. Yes, sir. We find almost invariably a stain will appear on any white hull that is used in the Missouri River. Quite frequently a blob or glob of grease will be found to appear on the hull and it requires cleaning of the boat nearly every time it is used in the river if you are going to keep it looking nice.

Q. Do you and the members of your club use your boats for sport fishing in the river or do you engage in sport fishing?

A. Our organization is not made up to a great percentage of fishermen. However, myself and several others of the group do considerable sport fishing in the river.

Q. Have you ever had any interference with your fish lines in that river?

A. Yes, to a great extent.

Q. Would you describe that to us?

A. On trot lines especially or set lines, bank lines that we set on the sand bars, you continually catch foul foreign matter in the form of strings of tissue and other foul types of sewerage that greatly discourages a great deal of the fishermen.

Q. Does your club ever have picnics on sand bars in the river?

A. Yes, sir. I would say approximately every Sunday there would be at least one or two family outings and then the boat club as an organization holds one or two general outings per year on the sand bars always.

Q. How would you describe the odor conditions on those sand bars?

A. If there is a very good breeze, why, it is quite pleasant, but at times when the weather is rather muggy and not much breeze we get a foul odor from the river. I am not much on describing odors. I would say it would be a rancid odor or rotten-egg type smell.

Q. How long have you been pleasure boating on that river?

A. Oh, ten years.

Q. Would you say that pleasure boating has increased on the river in recent years?

A. In the last three years probably 400 percent.

Q. In your trips up and down between Atchison and St. Joseph have you ever passed Oak Mills?

A. Not between St. Joseph and Atchison. Oak Mills is south of Atchison.

Q. South of Atchison. When you passed Oak Mills did you ever see cattle near the river?

A. Not to any great extent near Oak Mills. I have noticed dead stock to a considerable degree between, oh, in the Rushville area, in the Rushville Bend area.

Q. I am talking about livestock watering and drinking.

A. Oh, watering?

Q. Yes.

A. Oh, yes, livestock. You mean the stock that was alive?

Q. Yes.

A. Yes, to a great extent in the Oak Mills area there is quite a few cattle that use the river for drinking water, to some extent upriver from Atchison in the -- I think St. Benedict's farm has some cattle on one of the bars that uses the river facilities for drinking purposes.

Q. Does your boat club hold an annual picnic?

A. Yes, sir.

Q. Where do you hold that?

A. The last one was held on a sand bar right north of Atchison last fall.

Q. Have you eaten fish from the river?

A. Yes, sir.

Q. Have you ever noticed them have an extra taste?

A. As a general rule, no, but occasionally you will get a fish that I don't know whether it is psychological or not but it seems to me to taste of kerosene or oil.

Q. Do you know where those fish were caught?

A. Oh, yes, caught them myself.

Q. Where?

A. In the Missouri River between Atchison and St. Joe.

Q. Do you have potential members of your club inquire about the condition of the river before they join the club?

A. I would say we could, if we had less -- we would triple our membership easily if the river conditions were better. We have a certain group of people that wouldn't be interested in river boating from a safety factor, because they feel the stream is too swift, too severe, and they have heard of the whirlpools, and so forth, but a good many of them just feel it is too foul to use for recreational purposes.

Q. Mr. Dierking, you live in Atchison, don't you?

A. Yes, sir.

Q. And you drink their drinking water?

A. Yes, sir.

Q. What do you think of the taste of that water?

A. Under ideal circumstances we have grown accustomed to it to the point where it doesn't bother us any, but at times of low water in the wintertime and also on several occasions in the past where extra purification has been necessary the chlorine content has been such to cause a serious odor and also some sickness among people in Atchison.

Q. Do your parents ever visit you?

A. Yes, sir.

Q. Do you visit with them?

A. Yes, sir.

Q. How do they like to drink that water?

A. My wife's parents refuse to drink it. They are farm folks, retired farm family. They moved to Atchison about ten years ago and they have continued to haul their drinking water in from the farm ever since rather than drink chlorinated -- water that is chlorinated that heavy.

MR. STEIN: Thank you. No further questions.

CHAIRMAN SAMSON: Any cross-examination by either one of the States of Kansas or Missouri?

Cross-examination by your gentlemen?

MR. BROWN: No questions.

MR. SCHOENLAUB: No questions.

CHAIRMAN SAMSON: By the Board?

DR. MARTIN: One question.

CHAIRMAN SAMSON: Very well, Doctor.

Q. (By Dr. Martin.) Mr. Dierking, are the members of your club aware of the fact that the level of contamination in the river is considerably above what is recommended by experts in sanitary engineering at the permissible level for boating and recreation from the standpoint of health?

A. I don't think it has ever been brought out in a meeting. We have some members who are quite careful not to come in contact with the water physically. They will ride a boat in it but that is as far as they would want to go, but I don't think it has ever been brought out that we should not be using the river for recreational purposes.

DR. MARTIN: Thank you.

CHAIRMAN SAMSON: Mr. Poole has a question.

Q. (By Mr. Poole.) You referred to odors when you were picnicking along the bars. Can you give me some approximate locations of those bars? Are you talking about four miles upstream from Atchison or fourteen miles up or does it make any difference?

A. No, I would say the extent of my picnicking on the river has been done within five miles north of Atchison or from the Rushville area to the Atchison Bridge.

Q. And you have observed odors there at times?

A. Yes, sir, we have.

CHAIRMAN SAMSON: Mr. Johnson, Mr. Kurylo?

Q. (By Mr. Kurylo.) In your activities on the sand bars or in your boating up and down the river, have you ever seen any rats on the shore line?

A. I don't recall -- are you referring to house rats, sir?

Q. Any, house rats, river rats.

A. There are muskrats, of course, in most of the brush accumulations along the river and they are rats, they are large rats, but they are of a rodent nature and I would refer to them as rats. I don't recall seeing any house rats or sewer rats, as we would call them, along the river.

CHAIRMAN SAMSON: Any further questions?

You may be excused, Mr. Dierking.

(Witness excused.)

MR. STEIN: Mr. Van Horn.

WILLIAM VAN HORN,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. STEIN:

Q. Mr. Van Horn, will you state your name and address for the Board?

A. William Van Horn, 502 South 7th Street, Atchison, Kansas.

Q. You will recall, Mr. Van Horn, that you were sworn earlier and that oath still obtains?

A. Yes, sir.

Q. What is your profession or occupation?

A. Commercial fisherman.

Q. Is this your sole means of livelihood?

A. Yes, sir.

Q. Where do you catch your fish?

A. From Atchison about ten miles north, usually. Sometimes I fish below Atchison.

Q. How do you get your fish, by net?

A. Yes, hook nets, trammel nets, trot line, drag seine.

Q. Do you ever find any material in your nets other than fish?

A. Oh, yes.

Q. Do you want to describe those for the Board?

A. Oh, you find some substance that looks like coal tar, I don't know what it is, it is awful sticky, once it gets in the nets you can't get it out, and lots of, I don't know, once in a while there will be entrails of -- they seem to be from some kind of livestock. Then you get, oh, it is a grease, it looks like to me, little white particles, and it gobs up in your nets. And feathers once in a while.

Q. Do you find this material where you generally fish just north of Atchison in the Missouri River?

A. We find it about wherever we fish.

Q. But you do find it when you fish north of Atchison?

A. Yes, sir.

Q. What kind of fish do you generally catch?

A. Oh, cat, carp, buffalo, perch. Mostly carp, buffalo and cat.

Q. Have you ever seen chunks of white-looking grease floating down the river above Atchison?

A. I have, yes, sir.

Q. Have any customers ever complained that your fish have an oily taste?

A. We have had some complaints.

Q. What happens when they complain?

A. Well, either give them another fish or return their money.

Q. How long have you been fishing at that spot, Mr. Van Horn?

A. I would say right at 30 years.

Q. Well, would you say that the pleasure boats have been increasing on the river in the last few years?

A. Oh, yes, I would say they have increased 95 percent in the last three years.

Q. When you see these pleasure boats have you ever had occasion to look at the hulls of these boats?

A. I see them as they pass by, yes.

Q. Are there any accumulations on these hulls?

A. Some of them; sometimes those coming downstream are covered.

Q. Covered with what?

A. It looks like tar or grease to me.

Q. Have you ever seen people water skiing in the river?

A. I have, yes, sir.

Q. Do you ever see people swimming in the river?

A. Some, not many any more.

Q. While you are dragging a net in that river do you ever fall in?

A. Yes.

Q. Do you think that river is a nice place to work?

A. Well, that is all I know.

Q. Would you rather work in it if it were a little cleaner?

A. Oh, sure, yes sir.

MR. STEIN: No further questions.

CHAIRMAN SAMSON: Do you care to cross-examine?

MR. BROWN: I want to ask a question.

## CROSS-EXAMINATION

BY MR. BROWN:

Q. You say commercial fishing is your sole means of livelihood?

A. Yes, sir.

Q. Do you eat your own fish?

A. Yes,sir.

Q. You look pretty healthy. How much do you weigh?

A. A couple hundred.

Q. Hasn't taken your weight down, has it?

A. No, sir.

Q. Do you have customers that keep coming back?

A. Yes, sir.

Q. Regular customers?

A. Regular.

Q. They seem to be satisfied?

A. They do.

Q. Maybe it gives it an unusual flavor that is a little better?

A. Missouri fish are supposed to be the best fish in the United States.

MR. BROWN: I am glad to hear you say that. Thank you.

CHAIRMAN SAMSON: Mr. Schoenlaub?

MR. SCHOENLAUB: No questions.

CHAIRMAN SAMSON: Any questions by the Board?

Mr. Van Horn, we have some Van Horns in Nebraska who are bankers. Are you related to them?

A. I don't think so.

CHAIRMAN SAMSON: All right,thank you. You may be excused.

(Witness excused.)

MR. STEIN: Mr. Kessler.

FRED A. KESSLER,

Called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Mr. Kessler, will you give your name and address to the reporter?

A. Fred A. Kessler, 2726 North 52nd Terrace, Kansas City, Kansas.

Q. Mr. Kessler, are you interested in boating on the Missouri River?

A. Yes, sir.

Q. Are you a member of a boat club?

A. Yes, sir, the Heart of America Boat Club.

Q. Where is that boat club located?

A. Membership is Greater Kansas City.

Q. Do you hold any office in that club at the present time?

A. Not this year. I have been Commodore in '56.

Q. How long have you been a member of that club?

A. Since '54.

Q. And you have been using the river for boating since at least that time?

A. Well, I have boated on the Missouri River since about '47 and back in '27 to '32.

Q. What kind of a boat do you have now?

A. 14-foot runabout with outboard.

Q. What area of the river do you usually cruise in?

A. We come from usually Kansas City to Atchison. We have come to St. Joe. Then we go down as far as Lexington.

Q. Have you in the course of your boating seen people using the river for water skiing?

A. Yes, sir.

Q. Do members of your club water ski?

A. No, sir. They water ski, but not in the Missouri River.

Q. Do you water ski?

A. Yes, sir.

Q. Do you water ski in the Missouri River?

A. No, sir.

Q. Can you tell us why you don't?

A. Well, it is just a little dirtier than I care to water ski in. Our boat club has an organized cruise each month from March until October at usually either the Lake of the Ozarks or Grand Lake in Oklahoma. We do our water skiing in lake water.

Q. How far is the Lake of the Ozarks from your home?

A. About 170 miles.

Q. That is a little far for a trip back and forth, Mr. Kessler. What do you do, stay overnight there?

A. Well, usually we go down Friday afternoon and come back Sunday night.

Q. Do you take your family with you?

A. Yes, sir.

Q. Do the other members of the club take their families?

A. They do.

Q. That gets to be pretty expensive, doesn't it?

A. It does. We have talked about that and on one particular cruise where we kept a fairly accurate check, club members spent a little over $800.00 from the time they left home until they come back.

Q. In other words, rather than use the polluted water of the Missouri River for an activity which would bring them into contact with the raw water, your club members spent a total of $800.00 and traveled approximately 350 miles to what they considered better water?

MR. BROWN: Well, now, just a moment. I don't object to too much leading, but I think the witness ought to testify rather than the counsel.

CHAIRMAN SAMSON: Sustained.

Q. (By Mr. Edelman.) Would your club members prefer to water ski at a place closer to their home?

A. That is right.

Q. Will you tell me why?

A. Well, the expense, for one thing. There are a few that go to Olathe Lake, which isn't too far, but it is pretty confining because over the weekends the smaller lakes get awful crowded. And from a safety angle, why, it gets pretty congested.

MR. EDELMAN: We have no further questions, Mr. Chairman.

CHAIRMAN SAMSON: Any cross examination, gentlemen?

MR. SCHOENLAUB: I have one.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Kessler, if St. Joseph ceased dumping untreated sewage into the dirty Missouri would you stop your trips to Lake of the Ozarks and then resume water skiing in the dirty Missouri River?

A. If the Missouri River was clean I would cut down the trips to the Lake of the Ozarks, yes, sir.

Q. If the Missouri River were clean?

A. Yes, sir.

Q. How long have you lived close to the Missouri?

A. Well, I have lived in Kansas City all my life.

Q. And the Missouri is a dirty river?

A. It is a little dirtier down there than it is up here.

Q. But it is a dirty river?

A. That is right.

Q. You mean you would water ski outside of St. Joseph?

A. No. No, we have been up as far as White Cloud, but I never found any place yet between Kansas City and White Cloud that I would care to water ski in.

Q. Up as far as White Cloud you have yet to find any place where you would water ski?

A. Yes, sir.

Q. If the water of Kansas City, Kansas, was the same as it is at White Cloud you would continue going to the Lake of the Ozarks?

A. Yes, sir.

MR. SCHOENLAUB: No more questions.

CHAIRMAN SAMSON: Any questions, Mr. Brown?

MR. BROWN: No, I have none.

CHAIRMAN SAMSON: Any questions by the Board?

Q. (By Chairman Samson.) Let me ask you, Mr. Kessler, what is your occupation?

A. Garage owner.

CHAIRMAN SAMSON: I have no further questions. You may be excused.

(Witness excused.)

MR. STEIN: Mr. Billups.

TRUMAN BILLUPS,

called as a witness on behalf of the Government, being duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. STEIN:

Q. Would you state your name and address for the Board, Mr. Billups?

A. Truman Billups.

MR. BROWN: Phillips?

A. Billups. I live at Wathena, Kansas, the address.

Q. (By Mr. Stein.) Mr. Billups, I remind you that you are still under oath.

A. Yes.

Q. Will you locate Wathena, Kansas? That is on the Kansas side?

A. Yes.

Q. Is it near the Missouri River?

A. Wathena is close to the Missouri River, but I live approximately eight miles southwest of Wathena.

Q. About how many miles down from St. Joseph, below St. Joseph?

A. Oh, I would say it was approximately halfway between St. Joe and Atchison by the river.

Q. Have you a commercial fishing license?

A. Well, it has lapsed now. I usually keep it up.

Q. When you fish what do you generally fish?

A. I didn't catch the question.

Q. What do you generally catch when you fish?

A. Oh, carp, buffalo.

Q. Will you describe for this Board some of the material other than fish you have seen while you fished in the Missouri River?

A. I think Mr. Van Horn pretty well summed that up.

Q. Where do you fish? What area do you fish in?

A. Why, mostly in the Kenmore Bend.

Q. Where is the Kenmore Bend?

A. Well, that is that part of the river that I live on down there.

Q. Is it about halfway between Atchison --

A. Approximately, yes.

Q. -- and St. Joseph? Would you want to very briefly, just for the Board, go over some of the material you have seen? Have you ever seen white-looking grease?

A. Yes.

Q. Have you ever seen contraceptives in the river?

A. Yes.

Q. Have you ever seen people swimming in the river?

A. Occasionally.

Q. Have you ever seen people water ski in the river?

A. Yes.

Q. Have you ever seen stock watering of cattle near the river?

A. Yes.

Q. Where.

A. Oh, most any places up and down the river where there is enough grass to pasture along the river, people that has got cattle water out of it.

Q. Have you noticed an increase in pleasure boating in the last few years in the river?

A. Oh, yes.

MR. STEIN: We have no further questions.

CHAIRMAN SAMSON: Cross-examination?

MR. SCHOENLAUB: I have one question.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Billups, you live on the river?

A. Yes, my farm is --

Q. You are familiar with farmers who live in the bottoms around the river?

A. Will you ask that again, please?

Q. You are familiar with farmers who live in the bottoms around the river?

A. Yes.

Q. Do you know any farmers around the river who have wells?

A. Yes.

Q. Do you know how deep they have to go in a well to obtain water in the bottoms?

A. My well is 50 feet.

Q. In the bottoms?

A. In the bottoms.

Q. Next to the river?

A. Yes.

MR. SCHOENLAUB: No more questions.

CHAIRMAN SAMSON: Any questions by the Board? Any further redirect?

MR. STEIN: No.

CHAIRMAN SAMSON: You may be excused.

(Witness excused.)

MR. EDELMAN: Mr. Clark.

## HAROLD F. CLARK,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

### DIRECT EXAMINATION

BY MR. EDELMAN:

Q. Will you give your name and address to the reporter, Mr. Clark?

A. Harold F. Clark, 251 Boving Avenue, Lancaster, Ohio.

Q. What formal degrees do you hold, Mr. Clark?

A. I hold an A.B. degree with a major in chemistry and bacteriology from the University of Kansas, a master's degree in bacteriology from the University of Kansas, plus two years of graduate study at that university.

Q. By whom are you employed?

A. My present employer is the United States Public Health Service, Robert A. Taft Sanitary Engineering Center, in bacteriology, at Cincinnati, Ohio, and I am in charge of water quality studies in the water supply and water research branch.

Q. What in general are your duties in that position?

A. My duties in that position consist of a study of the indicator organisms that indicate pollution, an evaluation of an investigation of methods that have been proposed or described, a study of the standard procedures that are in use now, an investigation of new procedures that will yield more data, an interpretation of those results, directing research in water bacteriology and special water problems, and evaluation of laboratories in accordance with Standard Methods procedures.

Q. Did you have any experience in bacteriology prior to that employment?

A. Yes, sir.

Q. Will you tell us what that was?

A. I taught bacteriology as an instructor at the University of Kansas for some five, six years. I was chief bacteriologist on a special problem for 18 months for the Pillsbury Flour Mills. I worked as a bacteriologist for the National Institute of Health in Washington, D.C., with special investigations on tuberculosis organisms. In the Army, I spent five years with the sanitary corps as a bacteriologist. And for the past 15 years I have been in the employ of the Robert A. Taft -- of the United States Public Health Service, the old Ohio Stream Pollution Laboratory, later named the Environmental Health Center, now designated as the Robert A. Taft Engineering Center.

Q. Mr. Clark, I believe you said that your official duties involved special studies of indicator organisms of sewage pollution, is that right?

A. Special indicator organisms of pollution, yes, sir.

Q. Pollution. Can you tell us what the significance of the presence of any such indicator organisms in pollution would be to the field of sanitary engineering or health?

A. Well, the theory of the use of indicators of pollution is to measure the amount of fecal pollution that may appear in the sewage. We can do that by several different ways. We can measure the coliform organisms, which are the accepted pollution indicators, or we can develop special methods that are related to the fecal load in sewage or water to determine more accurately the total amount of fecal pollution that will occur in sewage, stream pollution, waters, and the use in potable waters. Actually any organism can be used as a sanitary indicator of pollution if that organism is constantly present in the guts of warm-blooded animals and humans.

Q. Are these indicators of fecal pollution generally -- are they considered to be indicators of the presence of other organisms which might be harmful?

A. In the presence of feces from one or two individuals perhaps it wouldn't have too much significance. However, as you increase the number of samples of fecal pollution from the number of individuals you will eventually find that you will reach a level where various types of pathogenic organisms are present, due to the people suffering from diseases or due to the carrier state, and it is a certainty that if a large number of coliforms exist and that that situation is not remedied that there is a possibility that pathogenic organisms will be present at any moment and it is a certanity or a probability that they will be present sooner or later if that condition is not remedied.

Q. Can you tell us what pathogenic water-borne organisms are generally associated with the presence of indicators of fecal pollution?

A. Well, one of your most common organisms, and your classical organism, would be the Salmonella typhosus. That is a source of typhoid fever. You also have your Salmonella paratyphi --

Q. Mr. Clark, do you have a list of these words? I think they are getting a little involved. I wouldn't know how to spell them.

A. I think I have one here. Would you like this list for some of the other people present?

(Off the record.)

Q. (By Mr. Edelman.) Will you resume, Mr. Clark?

A. Yes, sir. The types of organisms that would be present in fecal pollution and might be expected to be found present at any time would be, first, the group of Salmonella. Now, the most common organism of that is Salmonella typhi or the cause of typhoid fever. There is also quite frequently present Salmonella paratyphosus and Salmonella schottmulleri, which were commonly known as paratyphoid A and paratyphoid B. There are also a number of other Salmonellas that may be present that produce small or intestinal distresses for short periods, that would be nonreportable, would be characterized by perhaps a diarrhea or a constipation and a stomachache or pain that would last a few days. There are certain of the Salmonellas also natural inhabitants in ducks and other animals which might at times be pathogenetic for humans.

The second group of organisms that are commonly present characterized as enteric diseases are Shigellas, which we consider the cause of shigellosis. Most common among those are the Shigella dysenteriae and the Shigella flexner.

Also quite frequently found in cattle, and which my medical consultants advise me can produce disease in humans, are your causes of brucellosis. That is your group of Brucella. That is commonly known in cattle, I believe, as contagious abortion. And in humans it can produce Malta fever or various types of fever. It has another name but the name escapes me right now.

MR. BROWN: Undulant fever?

A. Undulant fever. Thank you. Undulant fever in humans.

Also in hospitals where they treat tuberculosis or in cases where tuberculosis exists in humans or in cattle where it is of a pulmonary nature, the tuberculosis organisms are always expelled through the feces, so both bovine tuberculosis and human tuberculosis would be a possibility.

Now, of lesser importance to many people, but nethertheless of very significant importance, are your types of human or animal parasites. And such things as the round worms, the Ascaris lumbricoides, and other Ascaris, the tapeworms, and so forth, may exist.

We also have a contact disease known as leptospirosis, which is caused -- the reservoir of that, so far as I am advised, is the feces or urine of rats and that is spread mostly by contact. So, therefore, that would only be considered a contact disease among workers.

Further south in the Tropics we also have the species of microspira cholerae, which are the cause of cholera, and we also have the Entamoeba histolytica, which differs from the bacillary dysenteries in that it produces amoebic dysentery. There have been in recent years certain epidemics of Entamoeba histolytica reported in the north, but that is in special instances and not a common cause this far north.

And usually the list has attached bacillus anthracis, the cause of anthrax. And I would like to add, I have no records of recent infections of anthrax from sewage.

Q. (By Mr. Edelman.) Are there any viruses that are associated with sewage, Mr. Clark?

A. Yes, sir. To my personal knowledge this is not in the Missouri River, but I think that we can reason by analogy that it is a possibility. I have isolated the poliomyelitis virus from the interceptor sewers of Manila, and others have reported many isolations of virus from fecal samples. For instance, Sabin and one of his co-workers isolated what they called the orphan virus from I forget how many, but maybe 10 percent, 15 percent, of the number of children that they tested. I think there were some -- well, I can't give you figures, but they isolated an appreciable number from the feces of children in Cincinnati under 18 years of age. And his co-worker also got a higher percent isolation of viruses from the feces of children in Mexico City and Monterey, Mexico.

I would think that viruses can be a very real problem in fecal pollution.

Q. Mr. Clark, did your studies of special indicator organisms lead you to organisms which you consider to furnish a more reliable test than the use of a total coliform group?

A. Yes, sir, they did.

Q. Will you tell us what these organisms are and why they indicate pollution and why they indicate pollution more reliably than the total coliform group?

A. I have over the past four years developed two sets of indicator organisms. The first set I am going to define as the fecal coliform group. Now, just to clarify the definition, my definition of a fecal organism is quite simple. A fecal organism is any organism that is normally and constantly present in the intestinal tract always of all warm-blooded animals. This fecal coliform group I have established by taking a sample of 25 normal adult individuals, the fecal samples. Each sample had 100 to 200 strains of coliforms isolated and a solid media. I would emphasize that solid media portion because if they are isolated on liquid media you can't tell which strain is going to overgrow one another. But when they are isolated on solid media, each individual organism has its little place to grow on the media, it develops into a single colony, and that colony can be studied and you can base your results on a percentage distribution.

At first we took 200 organisms from each sample. Later I reduced it to 100 when I found the statistical analysis that the percentage difference from a 100 colony sample and a 200 colony sample varied less than a percent in the second decimal point.

These were submitted to a new test. They were grown in Lauryl tryptose broth just as described in the Tenth Edition for the Standard Methods for the Examination of Water Sewage and Industrial Wastes. They were grown on solid media and then transferred -- correction -- and then transferred to Lauryl tryptose broth and grown. There they produced gas within 48 hours, plus or minus three hours. Those organisms were then inoculated by transferring one three mm loupe containing approximately a 50th of a cc to EC media, which was immediately placed in a water bath controlled at 44.5 to 45.0 degrees centigrade for 24 hours plus or minus one hour. These organisms produced gas; they were classified as a positive organism test. If they failed to produce gas it was an exclusion test and excluded it from the fecal group.

Now, to enable the Board to evaluate the correlation of this test I would like to say that of 2500 strains isolated from 25 humans, all certified normal by physical examination, 96 percent of the strains were positive according to their source, and that is the weakest portion of the test. For cows, we have a percentage of 97 percent. For hogs and fowls and birds, turkeys and chickens, it runs 98 percent. And we got slightly better results with our sheep, which gave us a hundred percent positives all the way through.

So I can say that this test will give you a positive result indicating fecal source within a 96 percent competence level. And in the future, when I refer to fecal coliform reactions it will be defined as the coliforms which are Gram-negative rods, facultative, anaerobic, and aerobic, nonspore producers, which produce gas from lactose in 24 hours at a 44.5 to a 45.0 incubation temperature.

Q. Mr. Clark, out of this fecal coliform reaction test you have just described, compare with it tentative Standard Methods procedure for the purpose of identifying the same organism.

A. Sir, I have a very poor memory. May I refer to my Standard Methods?

Q. Go ahead.

A. In the Standard Methods, as soon as I find it, Table 2, on Page 391, it refers to Escherichia coli as a commonly designated source fecal. These comprise the Escherichia coli group type 1, which is classified by the IMViC classification as plus plus minus minus. It also includes the variety 2, which is classified by the IMViC typing as minus plus minus minus.

Applying this classification to the samples I have previously described, I would get approximately 83 percent of these organisms as fecal types. However, applying the new test, which I am recommending, we would run a positive as to source with a 96 percent constance level. I might also add --

MR. BROWN: If I could interrupt a moment, I might shorten this. I am willing to concede after all this that he has discovered a new method. All I am interested in is the results and if you can get the results we can shorten it, gentlemen.

MR. EDELMAN: We have another organism to go over, Mr. Brown. I think it is important.

MR. BROWN: I don't think anybody understands this except the scientists here and I doubt that they do.

MR. EDELMAN: I will say it took me a little time.

Q. (By Mr. Edelman.) Did you in these tests utilize a Streptococcus organism, Mr. Clark?

A. With everybody's permission, I will shorten the description of this organism. Yes, sir, I did. May I add one answer to the fecal Streptococci first? I also tested numerous soils remote from fecal pollution or known pollution and was unable to discover any of the fecal strains in soils up--that is, the density was less than 20 organisms per gram.

As to the fecal Streptococci or the Streptococci group, we have used that. That uses a method whereby the Streptococci grow and in 48 hours produce a positive or negative reaction. The fecal Streptococci that we have isolated we also classified as to species and I would like to list those species for purposes later to be developed.

We isolated the faecalis, the Streptococcus faecalis, three or four varieties or biotypes, the Streptococcus mitis-salivarius group, the Streptococcus acidominiumus-equinus group, bovis and anginosus.

Those can, by specific methods, be typed out. The typing procedure involves the isolation of the organism and applying typing procedures. And I would like to mention that in the human strains we find 77 percent of the organisms belong to the Streptococcus faecalis strain, we find another 19 percent belong to the mitis-salivarius strain, we find also in humans a complete absence of the bovis types, the acidominiumus-equinus types in humans, while we find that these latter types are predominantly found in the feces of animals other than humans and that the faecalis or variants are very low in the animal strains as compared with the bovis, acidominiumus and the other animal classifications I have given.

Q. As I understand what you have just said, Dr. Clark, these Streptococci permit differentiation between human and animal strains, is that correct?

A. It permits a qualitative difference between fecal pollution from humans only, from animals only, and enables a person to form an intelligent estimate as to whether it came predominantly from humans, predominantly from other animals, or a little bit of both.

Q. How reliable do you consider the fecal Streptococci to be as an indicator of pollution?

A. Sir, I consider the fecal Streptococci to be a most reliable indicator. In my investigation over the past three years I have reached three definite conclusions. First, they are present in the feces of all warm-blooded animals or in all sewage that is polluted with the fecal feces of warm-blooded animals. Secondly, I have never been able to find them in pure water, in virgin soils, or any contact that does not show a recent history of pollution from animals or humans.

And, thirdly, because of their characteristics they do not tend to grow as do the coliforms. In other words, in the ordinary river I would say that the nutrient level is insufficient to support the growth of Streptococci as has been mentioned for the coliforms and perhaps exist in the fecal coliforms. And if you care to pursue that, I will present additional evidence.

Q. You participated in a study to determine the presence of these organisms in the Missouri River between St. Joseph, Missouri and Kansas City, Kansas, Mr. Clark?

A. Yes, sir, I have participated in such study. In fact, I and my assistants, or my assistants, took each sample that was collected in the survey during the period April 20th to May 18th and ran them for the presence of the fecal coliforms and for the presence of Streptococci.

Q. On what other days were samples taken that you used in these tests, Mr. Clark?

A. The samples were taken either at the plant intakes on around-the-clock sampling or by taking a grab sample at the intake on the periods of April 20th to May 18th, totaling 22 sample days, which constituted every sample that was collected from the Missouri River, to my knowledge.

Q. Mr. Clark, was the flow of the Missouri River during this entire period a low flow or did it have periods of high flow?

A. I am --

Q. As far as you were informed?

A. I had the records of those, but I don't fully recall them. The flows ran, I believe, from around 38,000 cubic feet per second and I think one time they ran up as high as 54,000 or 55,000 cubic feet per second. I don't want to give a definite answer, though.

Q. What I am getting at, Mr. Clark, is that as I recall Mr. Kittrell testified that because of the level of flow in the river he rejected certain sampling days as not indicative of the representative level of coliform. Did you reject any sampling days because of the level of the river?

A. Had I been dealing with the same group or organisms that Mr. Kittrell was, I would have followed his procedure. However, these organisms are fecal types and, therefore, I felt that if they were present they should be counted and there were no rejections made for any reason.

Q. In your opinion, did that affect the reliability of your examination of these samples?

A. The only effect it would have on -- it would not affect the reliability at all. The only effect it would have on the sample is that if the sewage flow was constant and the river flow increased there would be some reduction in numbers due to dilution.

Q. Now, will you please tell us, did you arrive at the average fecal coliform and Streptococci density at the water plant intakes of St.Joseph, Missouri, Atchison, Kansas, Leavenworth, Kansas, and Kansas City, Kansas, during the period that you have indicated these samples were taken?

A. Yes, sir, I did.

Q. Do you have a chart on this, Mr. Clark?

A. Yes, we have a chart, I believe, if I may get it.

MR. EDELMAN: I ask that this chart which is labeled "St. Joseph, Missouri, to Kansas City, Kansas, fecal coliforms at water plant intakes" be marked as Government Exhibit No. 30 for identification and that this chart being labeled "St. Joseph, Missouri to Kansas City, Kansas, fecal Streptococci at water plant intakes" be marked as Government Exhibit No. 31 for identification.

(Government Exhibits No. 30 and 31 marked for identification.)

Q. (By Mr. Edelman.) Will you tell us what those densities were, Mr. Clark?

A. I would like for the record to show that I am giving all figures in densities per hundred milliliters.

In this instance here this (indicating) represents the count of 11,500.

Q. You are referring to Government Exhibit No. 30 for identification, that is the fecal coliforms?

A. Yes, sir. It represents a count of 11,500, which was the average value over the 22 days' sampling, the median value over the 22 days' sampling. I am now advised that there are some sewer outfalls somewhere in between here (indicating). I believe that has been developed in testimony.

At the Atchison, Kansas, intake over the same period the density rose to 38,000, which represents an increase of 26,500 fecal coliforms per hundred milliliters. Now, assuming that there are no sewer outfalls between these two areas, I would have to say that the difference between this (indicating) and this (indicating), which is 26,500, represents the pollution that occurs in the St. Joseph area and between St. Joseph and Atchison. And that represents--this represents from this point here (indicating), subtracting the background count, to this point here (indicating) an increase of 230 percent.

At the Leavenworth intake the count drops down to 15,000, at this point here (indicating). Now, that represents a drop of 23,000 from the peak at Atchison or a drop of around 61 percent, approximately. But it still represents the accumulated pollution from above this point here (indicating) to this point here (indicating), an increase of 30.4 percent. That is a composite of the pollution that is occurring between the intake at St. Joe and the intake at Leavenworth, with the die-off rate or self-purification rate that might occur plus any added pollution that might occur in the area.

At the Kansas City water plant intake we drop to 11,200, which is a drop of 2.6 percent below the background count at St.Joe, and a difference of 60.8 percent from -- of 13 percent from Leavenworth, 60.8 percent from Atchison and -- sorry -- a drop of 2.6 percent from St. Joe down, a drop of 233 percent from Atchison down, and a drop of 25 percent from Leavenworth down.

Q. How about --

A. The fecal coliforms are a rather more sensitive organism and, therefore, that shows what happens when they are immersed in water and submitted to the self-purification procedures of the Missouri River plus added increase.

Q. Do you have an opinion as to whether sewage from St. Joseph, Missouri, is reflected at the Kansas City, Kansas, intake?

A. It is my personal opinion, based upon my professional experience, that the less organic material that is supplied for food for the organisms the more rapid the die-off rate would be, the more rapid the sedimentation rate would be, and the less food there would be to support growth. So, therefore, I would say that if you cut down upon the organics supplied proportionately down the river you would probably cut down upon the survival of the organisms. While I can't prove it beyond my tagged organisms, I would presume that a small percentage of those in Kansas City do reflect St. Joe pollution, that a slightly larger -- about an equal percent, due to the lesser pollution loads, reflect those at Atchison and, of course, some of those came from Leavenworth pollution.

Q. How about the fecal Streptococci on Government Exhibit No. 31?

A. The fecal Streptococci --

CHAIRMAN SAMSON: I wonder if this might not be a good breaking-off point for about a 10 or 15 minute recess. We have been working for about two hours, so we will recess for 15 minutes.

(RECESS)

CHAIRMAN SAMSON: The Board will convene and we will go to work.

Q. (By Mr. Edelman.) Mr. Clark, referring to Government Exhibit for identification No. 31, will you tell us what levels of fecal Streptococci you found at these water plant intakes?

A. Yes, sir, I will. The fecal Streptococci at the St. Joseph water intake represented 38,500 density. At the Atchison intake this value increased to 130,000. At the Leavenworth intake it dropped to a 59,000 level. And at the Kansas City intake it dropped to a 51,000 level. Now, subtracting this (indicating) from this (indicating) you would get an increase of 91,500 Streptococci, which --

CHAIRMAN SAMSON: Doctor, that is a little bit indefinite. You said subtracting this from that. For the purpose of the record will you say what you are subtracting what from what?

A. Yes, I will reword it. Subtracting the fecal Streptococci load at the St.Joseph intake of 38,500 from the peak load at Atchison of 130,000, you have left 91,500 Streptococci, which represents an increase of 238 percent over the background count at the St. Joe intake.

Now, for purposes of comparison, this increase in this 25 miles was 238 percent for the Streptococci, and going back to the fecal coliforms we got an increase of 230 percent, which between these two points gives fair agreement between the fecal coliforms and the fecal Streptococci. However, the fecal Streptococci are a tougher organism.

Subtracting the level at Atchison of 59,000 from the peak load of 130,000, that leaves a decrease of 71,000 or 54 percent between these two points on the chart. It also represents an increase of 20,500 over the background load at the intake at St. Joe or that represents that this (indicating) is 53 percent, approximately, higher than this background load (indicating).

At Kansas City the drop is to 51,000, which represents some decrease but not much.

This shows how much tougher the Streptococci are as compared with the fecal coliforms.

Q. (By Mr. Edelman.) To what extent is pollution from St. Joseph, Missouri, involved at Leavenworth and Kansas City with respect to the levels of fecal Streptococci you found there?

A. Well, based upon the expected fecal load in Atchison, if the St. Joe pollution did not come in the Atchison load should show the same slope drop between St. Joe and Atchison as it shows between Leavenworth and Kansas City. So, therefore, I should say that at least a portion of these Streptococci came from St. Joe, some from Atchison, and they persist until they get to Kansas City. Since the die-off rate in the flow times is not very marked for the Streptococci, I would assume that the loading at Kansas City of the fecal Streptococci that remained should be prorated among the population pollution index of the various places along the Missouri River. That is purely my personal opinion based upon my experience.

Q. Mr. Clark, did you make any further examination of samples from the Missouri River using another method of laboratory examination?

A. Yes, sir, I did.

Q. What method did you use?

A. I used a method that is titled the delayed incubation test for coliforms and a delayed incubation test for Streptococci using a membrane filter procedure.

CHAIRMAN SAMSON: What procedure?

A. Using a membrane filter procedure.

Q. (By Mr. Edelman.) Can you tell us very briefly what the membrane filter procedure involves?

A. Yes, sir. The membrane filter is composed of esters of cellulose, a molecule in thickness, with an average porosity of from 4/10ths to 5/10ths of a micron. These sterile filters are placed on a receptacle, the sample of water is filtered through the membrane and all the bacteria being much larger than the pores of the membrane are retained upon the surface of the membrane. That membrane is then transferred to a sterile holding media, which supplies nutrients but contains a sodium benzoate for the coliforms which reduces the rate of growth. Those samples were mailed to me in my Cincinnati laboratory.

There the colonies were grown, counted, verified, and the coliform colonies submitted to the fecal coliform test. All of those that did not comply with the previous definition of fecal coliforms were discarded and not recorded in my data. The Streptococci colonies were also counted and the Streptococci broken down into species for identification as to their possible sources.

Q. How were these fecal coliform and fecal Streptococci counted, Mr. Clark, under the membrane filter procedure?

A. On the membrane filter procedure each organism is collected on the surface of the membrane. Then when applied -- when proper nutrients are applied the organism grows into a colony anywhere from a millimeter to several millimeters in diameter. For the coliforms they are also characterized with a green metallic sheen, and these colonies are counted directly and it represents a direct colony count of the bacteria present. In the data that I have reported the only error that could occur that I know of would be a slightly lower density than should occur due to the fact that when you are dealing with individual organisms some are not as strong as the others and they do not all grow. The same is true for the Streptococci. They were counted directly as colonies. However, the Streptococci media is unique in that nothing, so far as I know, but Streptococci are able to grow on this media that is defined as WPCK of Streptococci media.

Q. On what date were the samples that you examined collected, Mr. Clark?

A. The samples were collected on the period of June 16th, 17th, 18th and 19th, after a long period of high water and the river had been flushed out thoroughly and had gone down to a flow level -- well, I am sorry I don't have it, but I would judge somewhere between 37,000 and 44,000 cubic feet per second.

Q. At what points were these samples taken?

A. These samples were taken at the points as listed in this chart here. Specifically, the Leavenworth -- pardon -- the St. Joe water intake, the Atchison water intake, the Leavenworth water intake, and the Kansas City, Kansas, water intake.

Q. Did you after this laboratory examination determine the levels of these organisms at these points?

A. Yes, sir, I did.

Q. Will you tell us what they were?

A. My data will be rather hard to follow. I have made a Verifax copy of my original chart. Would you like to see it?

Q. Let me have it. Do you have additional copies?

A. I have several copies.

MR. EDELMAN: I ask that this page entitled "Membrane filter counts on Missouri River June 16, 17, 18, and 19, 1959, counts per 100 milliliters of river water" be marked as Government Exhibit for identification No. 32.

(Government Exhibit No. 32
marked for identification.)

MR. EDELMAN: There are copies for counsel.

A. This chart was prepared by me personally.

Q. (By Mr. Edelman.) Will you proceed, Mr. Clark?

A. I would like to round out the figures; the exact figures are printed on the chart but I would like to round out the figures to two significant digits in my interpretation.

The fecal coliforms I will take up first. The fecal coliforms during this week's period were 2500 at the St. Joseph intake, specifically mile 464.5. At river mile 434.5 at Atchison, Kansas, the density was 14,000 fecal coliforms.

At Leavenworth, Kansas, mile 408.8, the density was 14,200 fecal coliforms per hundred milliliters.

And at Kansas City, Kansas, mile 385, the density was 13,800 fecal coliforms per hundred milliliters.

As I have mentioned before, these fecal coliforms have an entirely different die-off rate from those of the Streptococci, although the Streptococci show accumulated density as we go down the river for this study. At the Streptococci level above St. Joe was 2300 per hundred milliliters.

At Atchison, Kansas, the density had increased to 20,000, which I interpret as being due to the pollution existing entering the Missouri River between mile 464.5 and mile 434.5.

The density increased to 27,000 at mile 408.8, showing an increase of 434.5--between mile 434.5 and mile 408.8 of 7,000. That 7,000 I will attribute to the Atchison pollution and perhaps some of it to the Leavenworth pollution.

At the Kansas City, Kansas, intake at mile 385, another 25 miles, approximately -- well, my arithmetic isn't very good -- another approximate 25 miles downstream -- it increased from 27,000 to 29,000. That would represent the pollution coming in from Leavenworth and along the river, plus the dilution that has occurred in any of the tributaries since they were very low in Streptococci. I do not have the data on the tributaries, however, with me.

CHAIRMAN SAMSON: Possibly I am confused a little, but I wonder, Mr. Clark, if I could interpose a question here? How do you correlate this exhibit with the exhibits that you have on the stands back there?

A. These were run at a time when the river was fluctuating very high and very low, high water. And these are the accumulative data. This is a supplementary study made after this study was completed when the river was at very low levels.

Q. (By Mr. Edelman.) It also uses a different --

A. And it also uses an entirely different method of analysis. These (indicating) were run by the most probable number procedure, using the multiple tube result, and these (indicating) were run by the direct count procedure, using the membrane filter technique.

Q. Which do you consider more accurate, Mr. Clark, or is there any choice between them?

A. Personally, I consider the membrane filter procedure the most accurate of the lot.

CHAIRMAN SAMSON: Very well. Proceed.

A. They were run, though, on different days on the river, different weeks.

Q. (By Mr. Edelman.) To what extent do you consider pollution contributed to the Missouri River by St. Joseph, Missouri, is involved in the fecal coliform and Streptococci levels you have indicated exist at these downstream municipalities?

A. Would you repeat that question for me, please?

(Question read.)

A. Well, on the basis of this chart, on the basis of the data I have just testified to or on the basis of these charts here, it shows there is a considerable pollution coming in at the -- between St. Joe and Atchison to reflect a rather high pollution at the Atchison level. In addition to the bacteria contributed at this point there would also be organic compounds contributed. These organic compounds before the natural purification procedures of the river can occur to their best results have to be exhausted. Therefore I would consider that the organic pollution load as well as the bacterial load contributed on the various population equivalents down this stretch of the Missouri River are responsible according to the total amount of pollution contributed.

Q. (By Mr. Edelman.) Mr. Clark, did you conduct any further studies to identify the strains of fecal organisms from samples taken from the Missouri River in this area?

A. Yes, sir, I did.

Q. Can you tell us on what dates these samples were taken?

A. These were taken on the dates previously listed, June 16th, 17th, 18th, and 19th.

Q. And at what points on the river were these samples taken from?

A. The identification of these samples were performed upon the membrane filter samples that I have just testified to.

Q. Were these samples taken from points in the river at the water intakes of these --

A. They were taken at the water intakes.

Q. Will you tell me what this study showed with respect to the various strains present?

A. At mile 464.5, I believe it is, anyway it is the St. Joseph intake, we found that there were 70 percent Streptococcus fecalis plus three percent Streptococcus anginosus. Now, my studies have shown that these are found only in human fecal pollution. That represents a total of 73 percent of the Streptococci occurring in the background count at St.Joseph intake were of human origin. On the same basis we found a complete absence of mitis-salivarius of human types, which is a very sensitive organism. We found a total of 23 percent of the fecalis biotypes of the acidominiumus-equinus group and of the Streptococcus bovis, characteristic animal species. That totaled a total of 23 percent.

Now, if we move downstream to the Atchison intake, the Streptococcus fecalis and the Streptococcus anginosus dropped but we did have one significant species appear in that Atchison intake sample. And that specifically was the presence of a 5 percent level of the Streptococcus mitis-salivarius group, which we have previously stated is an extremely sensitive organism and which occurs only, so far as my studies have shown, in the intestinal tract of man. That would be interpreted, that 5 percent level would be interpreted, as indicating considerable human pollution, domestic pollution, that is, from human sources, and of being reasonably fresh, because I am of the opinion that the mitis-salivarius would not survive in the river much longer than a 12-hour period at most. Of course that will depend somewhat on the type of river and the composition of the electrolytes present in the river.

On the other hand, at Atchison, the biotypes increased and fecalis biotypes, the acidominiumus-equinus group and the bovis increased respectively, 29 percent, 9 percent and 27 percent, for a total of 65 percent of the Stretococci strains resulting from animal pollution, pollution other than human fecal pollution. However, we continued downstream. At Leavenworth the percentage of human strains were 23 percent, the percentage of animal strains were 73 percent.

CHAIRMAN SAMSON: Where was that?

A. At Leavenworth, Kansas. Now, one remark on this. Do not try to add these up and get a hundred percent because there are some of the strains, species, that are shared both in animals and human feces and for that reason you will never get a hundred percent of your Streptococci when you attempt to break them down into specific species.

At Kansas City, Kansas, the human strains had again increased to 53 percent and the animal strains had decreased to 39 percent. That is reasonably good correlation for bacteriological data and it probably indicates that the strains of animal types are a little bit more sensitive to the Missouri River environment than are the Streptococci of the human types.

Q. (By Mr. Edelman.) Mr. Clark, you indicated in testifying about the levels at Atchison and Leavenworth, as I recall, that the percentage of predominantly human strains decreased. Does that mean that there were less of these organisms in total numbers at Atchison and Leavenworth than there were at St. Joe?

A. Specifically at human strains in the St. Joe intake it ran 28,000. For human strains at Atchison it ran 39,000. Furthermore, I have gone ahead and calculated the relative amount of animal strains out of this total that exists down river, if you would care to have them.

Q. Well, if you have it I suppose we might as well -- we would appreciate having it.

A. The animal strains at the St. Joe intake were 8900 per hundred milliliters. The animal strains at the Atchison intake were 84,500 per hundred milliliters. The animal strains at the Leavenworth intake dropped to 43,700. And the animal strains at the Kansas City, Kansas, intake dropped to 20,000. As I recall, the human strains at the Kansas City, Kansas, intake were 27,000 or just 1,000 less than the background count at the St. Joseph intake for the same type of human strains.

Q. Mr. Clark, to what extent do you consider that drainage from tributaries entering the Missouri River appears in these counts?

A. Unless the drainage entering the Missouri River comes from outdoor toilets, from feedlots, or other sources of human or animal fecal pollution, I do not consider that the drainage entering the Missouri River would have any significant effect upon my type of data.

Q. Take into account the sources of pollution that have been described at this hearing, that is St. Joseph, Missouri, Atchison, Kansas, and Leavenworth, Kansas. Do you consider that these sources account for this level, for the total level that you found at Kansas City?

A. Yes, I would think they would.

Q. And that to the extent that there were tributaries in the river entering the Missouri River in this area, would they significantly affect these totals?

A. The MPN's we found or the Streptococci we found by the MPN methods on the tributaries, as I recall, were not of sufficient magnitude to consider them in my calculations or thinking.

Q. Based on your knowledge and experience in the field of bacteriology, can you tell us whether this level of pollution which exists from St. Joseph down to Kansas City, Kansas, constitutes a health hazard to persons using the river, either for activities which bring them in direct contact with the raw water or as a source of water supply?

A. In my opinion, the fecal coliform levels and the fecal Streptococci levels are above the level that should be accepted anywhere along the river and they do constitute a health hazard, because with this density of fecal pollution, both from human and animal sources, entering the river at times there will be pathogenic organisms present of those types I have mentioned. It will not -- you will not every time that you have a high coliform level have pathogens present, but they will appear a significant number of times out of the year, and at unknown times, to constitute a health hazard to both those that come in contact with the river, if it should occur in treatment breakdowns, and an additional hazard that has not been recognized too much where the polluted water could possibly come in contact with food products that were kept at a temperature above the 20-degree level for any period of time.

Q. Would the removal of settleable solids from sewage discharged in the St. Joseph area have any effect on the level of pollution that you have described?

A. The removal of settleable solids at any place along the river would remove the organic load, it would remove the food supply, and the more that you remove the food supply and reduce the organic load, it would also reduce the total number of bacteria entering into it. That would enable the river's natural purification processes, that is your Cilitia protozoa and your Amoeba and Paramecium and other organisms that are engaged in the summertime in eating up bacteria, to do a more efficient job and it would result in a lowered nutritional level for the organisms and consequently, a bacteria is just like anybody else, when it goes without food long enough it gets weak and dies.

Q. Would the removal of these solids also result in the removal of micro-organisms from the discharge? If I didn't use the right word, tell me.

A. The number of micro-organisms by removing settleable solids will be reduced. That reduction will occur, in the first place, because solids big enough to settle out will quite frequently contain bacteria in the solid particles itself held there by a process of occlusion. Furthermore, these settleable solids as they drop through the water to settle out have a certain absorptive capacity for bacteria and some of the bacteria will be absorbed on their surface. So, therefore, I would say that the absorption process would remove an appreciable number of bacteria.

MR. EDELMAN: At this time the Government offers Exhibits 30, 31 and 32, which have been marked for identification, into evidence as Exhibits 30, 31 and 32.

CHAIRMAN SAMSON: Any objections?

MR. SCHOENLAUB: No objection.

MR. BROWN: No objection.

CHAIRMAN SAMSON: They will be received.

(Government's Exhibits 30, 31
and 32 received in evidence.)

MR. EDELMAN: We have no further questions at this time, Mr. Chairman.

CHAIRMAN SAMSON: You may cross-examine.

CROSS-EXAMINATION

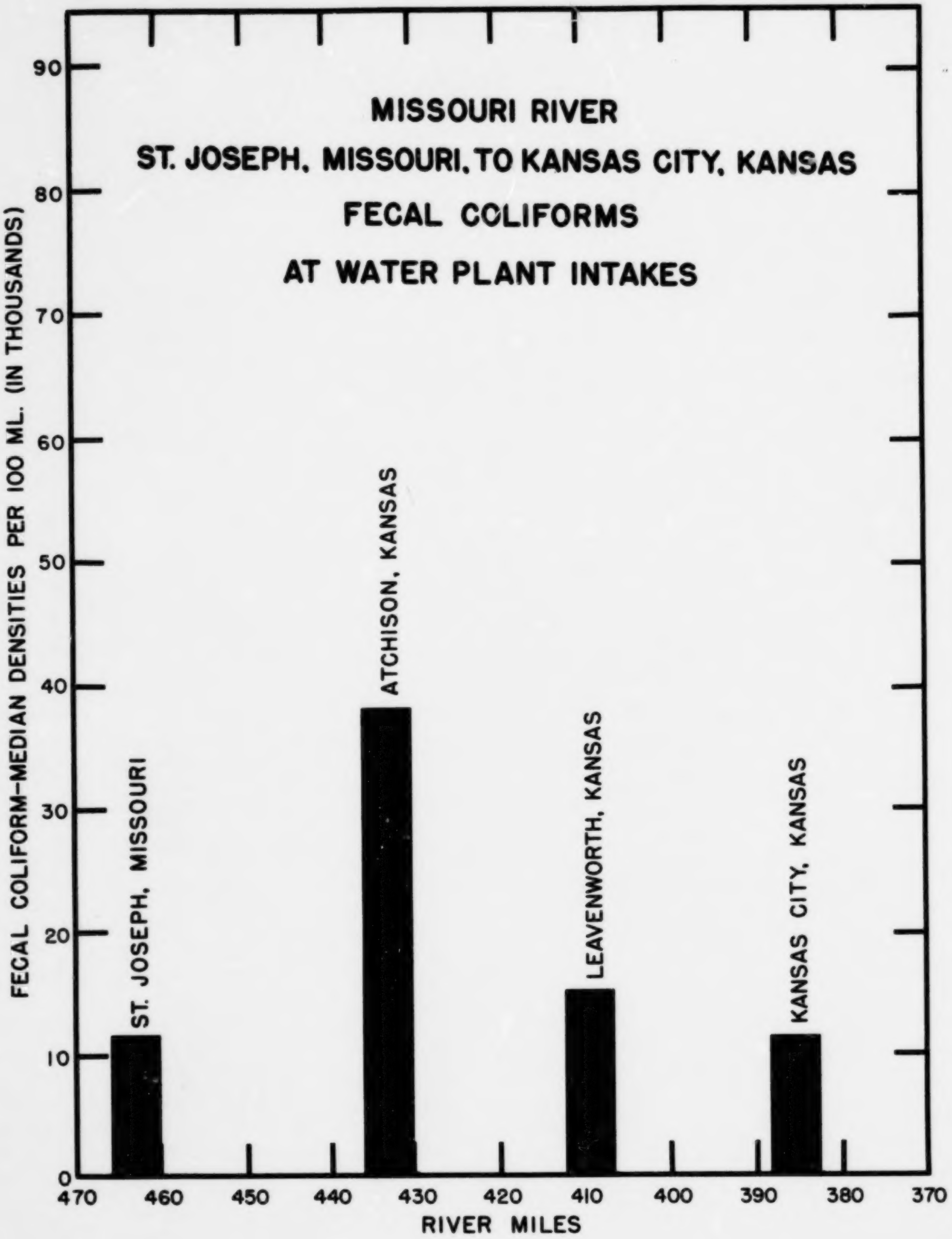
BY MR. SCHOENLAUB:

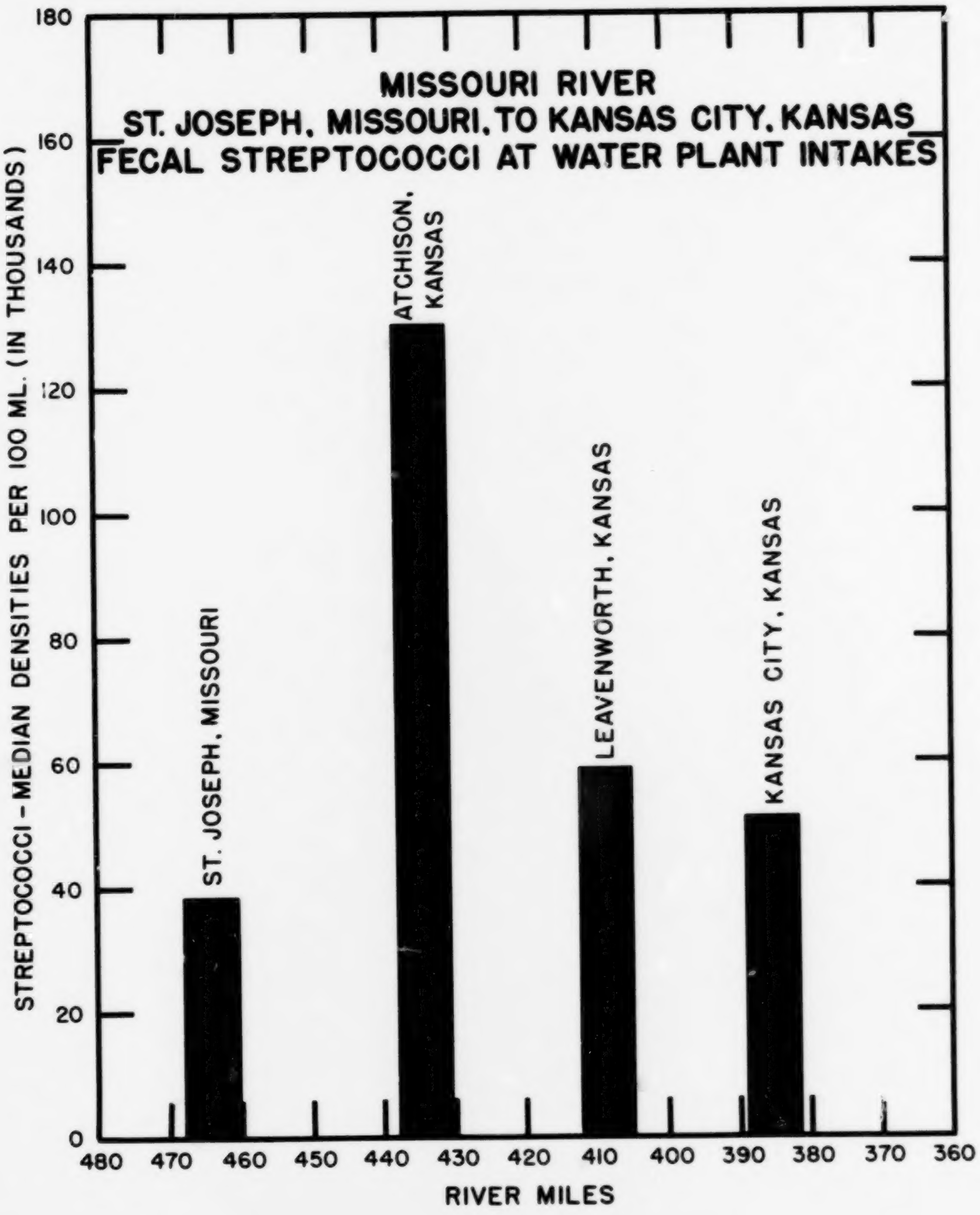
Q. I just have one question, Mr. Clark. With the removal of these settleable solids would that, in your opinion, reduce this count to a point that would make the river safe for swimming and general water uses and as a source of water supply?

A. I wish I could answer your question. I can't. The only answer I can give, that in my opinion it would accomplish some reduction. Now, I have read reports of where sedimentation have been reported in Metcalf and Eddy and other standard textbooks on bacteriology -- on engineering that sedimentation -- primary sedimentation removes anywhere from 25 to 70 percent of the total bacterial load in the sample.

Q. Which is quite a spread.

A. Which is quite a spread. And that the same percentage of pathogenic organisms would be removed by the same procedure as the nonpathogenic organisms, because it removes both of them. In my own experience on the


MISSOURI RIVER
ST. JOSEPH, MISSOURI, TO KANSAS CITY, KANSAS
FECAL COLIFORMS
AT WATER PLANT INTAKES
FECAL COLIFORM-MEDIAN DENSITIES PER 100 ML. (IN THOUSANDS)
0
10
20
30
40
50
60
70
80
90
ST. JOSEPH, MISSOURI
ATCHISON, KANSAS
LEAVENWORTH, KANSAS
KANSAS CITY, KANSAS
470
460
450
440
430
420
410
400
390
380
370
RIVER MILES


MISSOURI RIVER
ST. JOSEPH, MISSOURI, TO KANSAS CITY, KANSAS
FECAL STREPTOCOCCI AT WATER PLANT INTAKES
STREPTOCOCCI - MEDIAN DENSITIES PER 100 ML. (IN THOUSANDS)
180
160
140
120
100
80
60
40
20
0
ST. JOSEPH, MISSOURI
ATCHISON, KANSAS
LEAVENWORTH, KANSAS
KANSAS CITY, KANSAS
480
470
460
450
440
430
420
410
400
390
380
370
360
RIVER MILES

several times I have tried sedimentation basins the best percentage efficiency I could get for a three-hour detention time was roughly 30 to 33 percent. I am sorry that isn't much of an answer to you.

MR. SCHOENLAUB: That is fine. Thank you.

CROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Clark, you specifically in answering a question from the Government's counsel stated that you didn't think any outside pollution would affect your figures except in the case of outdoor toilets and feedlots.

A. Feedlots -- I qualified that to fecal sources.

Q. All right. I have no information that I can give you that would be worth anything on indoor or outdoor toilets since the day of rural electrification, but the feedlot situation in this territory is that St. Joseph and one spot in Iowa and one in Indiana are the heaviest feeding centers in the United States at the present time in the cattle industry.

A. Yes, sir.

Q. Assuming that to be true, that, of course, would have some effect on the amount of animal pollution that would be getting in the stream?

A. That is entirely possible.

Q. And you have no way of measuring that?

A. I have no way of measuring that. The only thing I based my opinion on, Mr. Brown, was this. The period examined by the membrane filter samples, which was dated June 16th, 17th, 18th, and 19th, was after a period of considerably high water when this watershed had been flushed off, and those samples I would consider to be fairly free from surface runoff and with insufficient coliforms to have been able to accumulate since that watershed had been flushed off to give you a very appreciable increase in a river the size of the Missouri River.

Q. What was the date of those measurements?

A. June 16th, 17th, 18th, and 19th.

Q. Do you remember whether that high water was caused by water upstream or water from some of the tributaries around here?

A. I can not answer that question because the only flow sheets -- flow data I have is listed at St. Joe. I do --

Q. We have had some rather heavy rains locally --

A. I do know that on the 31st of the previous month you had a discharge of around 50,000 feet, cubic feet per second, and I would think that maybe it would take a while for enough accumulation of fecal material. That is purely guesswork on my part, though, sir.

Q. Wouldn't it be a fair assumption, I don't know the total number of cattle killed in the city and the industries outside per day, but I know there are many, many times that amount of cattle living on feed around here daily on feedlots, that their feces ultimately reach the tributaries and the Missouri River. That would constitute a rather substantial source of pollution, wouldn't it?

A. Quite frankly I can't tell the difference between those that come in from the sewer and those that come in from feedlots.

Q. There is no way you can tell that?

A. No, sir.

Q. So your final figures for animal pollution necessarily must include what comes through the sewers and what comes in from other pollution?

A. That is an inescapable conclusion.

MR. BROWN: That is fine. Thank you very much. I am afraid to go further.

CHAIRMAN SAMSON: Any questions by the Board?

DR. MARTIN: I have a few questions.

CHAIRMAN SAMSON: Proceed, Doctor.

Q. (By Dr. Martin.) Mr. Clark, we have had set out to us earlier certain objectives for the coliform content of the water for water supply and recreational use at 5,000 coliforms per hundred ml and for swimming at 1,000 coliforms. Are you familiar with those general standards?

A. I have heard them, sir.

Q. From your own knowledge and experience would you affirm them as reasonable standards?

A. I would affirm them as reasonable standards if that was the best water available.

Q. Have any similar standards been set for such purposes as stock watering, which has been brought up previously in this hearing, not the standards but the question of whether the water was suitable for stock watering?

A. There are no such standards to my knowledge that have been mentioned in the United States. I believe England, the Metropolitan Water Board of London, is at present investigating data to derive such standards for dairy barns and pig lots, but they have not yet published their data so I can't give you any information other than that they are working on a standard.

Q. From your own knowledge and experience, Mr. Clark, can you tell this Board whether typhoid fever has been a problem in the Missouri Valley area? I believe that the earliest date mentioned was 1823.

A. From my own knowledge and experience I am unable to answer the question on typhoid fever. If I can revert from an expert witness to a lay witness for a minute, I will say that I grew up in this part of the country and I recall as I was growing up some 56 years ago there was considerably more typhoid fever than there is today.

Q. But you have made no study of the incidence, the occurrence, or anything else about typhoid fever in this area?

A. No, sir, Doctor. The incidence of typhoid fever is taken care of at our center by an epidemiologist and it is outside my province completely. I regret I can't answer you.

Q. Could you say whether in your opinion there was any direct relationship or significant relationship between the coliform count of water used as a source for public water supplies and the general level of health of the population served by that water supply?

A. Yes, sir, I can answer that one, I believe, Doctor. I have reviewed the records of the City of Cincinnati and as they extended and increased the quality of their water supply in the city the incidence of enteric diseases dropped tremendously, and much to their surprise also the incidence of nonenteric disease, such as pneumonia and colds and diphtheria, and so forth, also dropped. It doesn't seem like a reasonable thing, but that is what happened. That has also happened in New York City and similar data has occurred in other cities, and I believe that will be found and described in standard textbooks on epidemiology or sanitary engineering under the terms of the Mills-Reincke phenomenon, which says as the water quality increases the total morbidity rates on all diseases will drop somewhat, not only those of the enteric group.

DR. MARTIN: Thank you.

CHAIRMAN SAMSON: Any other questions?

MR. BROWN: I have a few more, Mr. Chairman.

CHAIRMAN SAMSON: All right.

Q. (By Mr. Brown.) Doctor, I take it you say you have an -- I was going to say epidemiologist -- you say endologist?

A. Epidemiologist.

Q. And you do not handle that particular phase of the cases?

A. I know nothing about it. I am purely a biologist.

Q. I take it that you can not pinpoint or give us any evidence of water-borne disease from the water along the Missouri River here in the area which you have studied?

A. You are restricting that to water along the Missouri River?

Q. Yes, sir, for the purpose of this one question.

A. I am unable to answer, sir.

Q. All right. Now, let's go a step further. Since you have developed these more definitive methods of determining the possibilities of this bacteria, have you examined any other watersheds?

A. Yes, sir, a few.

Q. Have you examined other watersheds where the human population is greater and the animal population or the waste from animal industry is less?

A. Yes, sir, I have examined the Ohio River, for instance, very recently.

Q. I would assume there is not much animal pollution there?

A. And there is no animal pollution of any extent except just what occurs along the river.

Q. You have human pollution there, then, I assume?

A. We have a lot of human pollution.

Q. Have you been able to pinpoint any water-borne disease there?

A. Again I haven't kept track of the disease rate, sir. I can give you the percentage of distribution upon the Streptococci, if you would like it, on the Ohio River.

Q. I would like it.

A. The Ohio River shows 90 percent Streptococcus fecalis, 1 percent Streptococcus mitis-salivarius and 5.5 percent animal types. The domestic sewage sampled at the Center from a strictly residental district of rather good quality homes showed a 90 percent -- an 88 percent Streptococcus fecalis and around 10 percent mitis-salivarius, making a 98 percent and 2 percent of a species of Streptococci I had never seen and was unable to identify and I named it Streptococci uncertaincidis, which means I don't know what it is. Another instance that happened, we recently had to study a lagoon.

Q. A what?

A. A lagoon where they were treating sewage by lagooning. It was at the London Prison Farm in Ohio. I studied it to use as evidence in this -- comparative evidence in this hearing. I didn't use it because it didn't show what I wanted it to show. It showed that through this lagoon we were getting a much higher Streptococci count than we were fecal coliform count and that you can look at and that is definitely, as you see here, the pattern where you have a lot of animal streps. They told me there were no animal streps in there, that no barn wastes went in there, and I had a good deal of doubt in my mind. Well, I went back and asked them to do a re-investigation and they came back and they explained the cause to me. They have 50 dairy workers and they wear a new uniform every day in the barn shoveling barn manure and on Monday evening they wash all of these dairy uniforms for the whole time and on Tuesday morning you get this high level of animal streps and then the rest of the week it drops down.

Q. Have you ever by any chance studied the Potomac?

A. I would very much love to get on the Potomac because I like Washington. No, sir.

Q. Do you know whether the Public Health Service that you work for has any plans at present to clean up the Potomac?

A. At present I am advised that we have a field survey crew on the Potomac, but I can't give you any more information on it.

Q. Isn't it true that it is one of the highest polluted rivers in the United States?

A. I couldn't answer that data.

Q. What I started out originally -- I went a little far afield -- I was hoping that perhaps you had made studies on rivers that had a relatively high percentage of animal streps and others where it was relatively high in pollution from human feces and it might be that there was a possibility that one river showed more actual disease than the other, but apparently that is not true?

A. I have no way of giving an answer that I would consider reliable, sir.

MR. BROWN: All right, sir. Thank you very much.

CHAIRMAN SAMSON: Any further questions by the Board?

MR. KURYLO: Yes, I have a few.

Q. (By Mr. Kurylo.) In your direct testimony you mentioned something about -- if you will look on this typewritten list you gave us and pick out the third name from the bottom and then state the name for the record.

A. Do you mean Leptospira icter ohaemorrhagiae?

Q. That is it. Now, I understand that that is a germ or a bug that comes from the feces or urine of rats.

A. The most commonly known reservoir of that is the sewer rats and it is spread by contact usually with rat feces or rat urine or water recently polluted by one or the other.

Q. Is that a disease?

A. It is a disease. I am not enough of a -- I don't know enough of medicines to give you the symptoms, but I do know it is a disease and it is spread by contact and I believe it is accompanied by some degree of jaundice.

Q. It is a disease that can be borne by human beings, then?

A. It is considered an occupational disease of sewer workers in both Paris and England.

Q. Assuming that rats settled at a water basin and their feces or urine flowed into a river, would these germs find themselves in the channel to some point downstream?

A. That, sir, I could not answer with accuracy. I can only say that in the last few issues of the -- in issues of the Public Health Reports of the last year there have been a number of cases of various Leptospira infections reported and that they in most cases were attributed to rats. There were some of the species attributed to dogs.

Q. Assuming the presence of some disease-carrying pathogenes in polluted waters in which there are some fecal coliforms and fecal Streptococci, and assuming the untreated wastes flow down to an intake of a water supply at some downstream point,let's take for example here Atchison, Kansas, and assuming a treatment method such as Atchison, Kansas, has, what is the probability of having the disease-bearing pathogenes survive the kind of treatment as compared with the probability of survival of either the fecal Streptococci or the fecal coliforms? In other words, are the disease-carrying pathogenes stronger than the fecal coliforms or fecal Streptococci?

A. No, sir. One of the requirements we place upon an indicator organism before it can be used is that it be more resistant to natural purification procedures, more resistant to chlorination, and more resistant to other treatment procedures than are the enteric pathogenes, and specifically we usually use Salmonella typhosus and Shigella dysentery for those comparative purposes. So if a water by any treatment procedure whatever is rendered free from coliform -- and may the record show that where I say "free from coliform" I mean one coliform per hundred or less -- there is no known reported disease ever occurring from the use of such water that I know of.

MR. POOLE: May I inject a question?

MR. KURYLO: Go ahead.

Q. (By Mr. Poole.) What about hepatitis in that situation?

A. Infectious hepatitis is caused by a viral disease and I regret to impose personal experiences upon this group, but I would like to in this one instance. One of the overseas general hospitals put their water point on a bend in a creek. Another creek up a hundred feet away they put their latrine and let it wash into the creek. What they hadn't realized was that that creek was a 300 -- a 3-mile bend and that their water point was downstream from the latrine. At the time I entered into it I was doing some work on hepatitis compliment fixation experimental work for the 19th Medical General Laboratory in New Guinea and at that time we had around three hundred-odd cases of infectious hepatitis out of the personnel attached to that military organization of five hundred fifty-odd. And all of those samples were to my personal knowledge chlorinated without filtration or flocculation, but with chlorination only at in excess of two milligrams per liter or two parts per million as you wish.

Q. (By Mr. Martin.) Well, then, I take it, Dr. Clark, that you feel that there is evidence to show that viral diseases may be transmitted by water samples which are completely clear from coliform organisms or at least there is this possibility?

A. If I could get you to qualify your question, in my opinion do I consider the possibility of viral diseases being transmitted by water, the answer is yes.

DR. MARTIN: Thank you.

A. I do not have, though, to this hearing Board evidence to present to prove it.

Q. (By Mr. Kurylo.) Would you, if you can, enumerate some of the viral diseases?

A. Poliomyelitis is one of the most important ones. Another one that is most important, especially from a military point of view, is your infectious hepatitis. Now, there are a number of other viral diseases of humans that have been classified under the name of the orphan viruses, because they haven't been thoroughly classified yet as to what they are, but they have been associated with disease by various medical investigators. However, being a bacteriologist and knowing nothing whatever of virus, I am unable to go further with that question.

Q. Would you elaborate a little on what you have mentioned several times in your statements as enteric pathogenes? Just what are they?

A. The enteric pathogenes as I have used them are those organisms which are the non-spore-bearing organisms which cause a variety of intestinal distresses, such as typhoid fever, the paratyphoids, the various types of dysenteries, and so forth. The most important ones are the various types of the bacillary dysenteries classified under the name of Shigella and those have been typed by serological means and I don't very much agree with their typing because they have got it up to 200 different kinds and I can't remember all of them. The typhoid fevers and your paratyphoids are the most common also.

Q. In other words, even though what you described as a potable water properly treated might reduce the number of coliforms and fecal Streptococci, the existence of these pollutable substances in the water could lead to a disease by someone who is using the water either for -- or comes in contact with the water by one means or another while the water is in the river in an untreated form?

A. That is correct. If they come in contact with the river by ingestion in any way, if their food particles happen to be polluted with the water at the time it contains pathogenic organisms, that could be a source of pollution. We have even found in our Arctic survey means that the sea gulls and the ducks can feed on the sewage outfalls in Alaska and then mechanically carry the typhoids and paratyphoids for up to ten days and expel it in the feces. While they are strictly mechanical carriers and the organisms don't produce any disease in the carrier, they do carry it to other sources -- to purer waters and may produce some pollution.

MR. KURYLO: I have no further questions.

CHAIRMAN SAMSON: I have a question or two.

Q. (By Chairman Samson.) What is a virus, Doctor?

A. I don't know that my answer is going to be any better than the one you could make for yourself, but I would consider the virus as any one of the disease-producing entities which has such a diameter that it is able to pass through a filter, a Berkefeld type filter which will remove all known bacteria, and which requires living, growing cells for its multiplication.

Q. Now, what is your opinion as to whether or not you will find such an organism, if that is what it can be classified as, in a river conditioned as you have testified to the Missouri River here at St. Joe, Missouri?

A. I think it would be possible to find it.

Q. Well, is it your best judgment based upon your professional experience, and I realize that you are not a -- is it a virologist, is that the term?

A. Yes, sir, that is a special field.

Q. Your best judgment, your opinion as to whether or not such organisms would be present in the Missouri River?

A. They are present in sewage, as I have already testified, I have personally isolated them by the monkey brain technique in Manila from the interceptors that run through the central part of the city of Manila in the Philippine Islands.

Q. Under conditions as it is alleged exists at the Missouri River near St. Joe, Missouri, is that right?

A. I would say under the conditions that exist at the outfalls. I do not know how long they would survive and have to predicate one other thing before we could have virus under such circumstances. We would have to predicate that there was a case of poliomyelitis or a number of cases of poliomyelitis expelling sufficient virus in infective doses into the sewage to be able to have sufficient density to make it a probability that you could come in contact with it.

Q. All right. My next question then is, what is the efficiency of a water treatment plant in the removal of such organisms? I am talking about a virus. What is your judgment as to whether such are removed in an ordinary water treatment plant?

A. I am not qualified to have an expert opinion on that subject, sir. I think it --

Q. Do you feel that ordinary chlorination sedimentation as we have heard about here would remove virus organisms?

A. I doubt if the chlorination would remove it, but as a personal opinion for just what it is worth, I think your best possibility of removing virus would be a very excellent sedimentation procedure so that the virus might be absorbed in the gelatinous flock and settle out and removed either in the gelatinous flock or absorbed in the gelatinous flock and removed upon the rapid sand filter when it reached that point.

Q. In other words, a high treatment plant probably would remove the viruses as it would remove the other matters that should be removed, is that right?

A. It has reasonable possibility,but, as you say, I am giving you answers as a layman now. I am not giving you as an expert on virus.

Q. I appreciate that. I have one more question and that is, can you tell us just what diseases come from or originate from fecal streptococci?

A. The fecal Streptococci as well as the fecal coliforms are normal inhabitants of the intestinal tract of all warm-blooded animals. There are no exceptions that I know of. And as such they are expelled, I would say that the fecal coliform level per capita per day will run somewhere from 1200 to 12,000 million organisms per capita per day. About half that number or a third that number will be fecal Streptococci. They normally are considered as nonpathogenic organisms. However, I am sorry to bring in one other exception. There are certain of the coliforms which have the -- give the typical EC reaction, give you a plus plus minus minus IMViC types, and which are biochemically indistinguishable from the harmless coliforms, but those coliforms have been classified as serological type one eleven, oh five five, oh one one, and two or three other serological types that I don't recall, and they have produced epidemics in children under one year of age and at times have resulted in deaths and they have produced some enteric distress in older individuals. Those organisms were recently reported in the Paris treated water supply.

CHAIRMAN SAMSON: Thank you very much.

Q. (By Mr. Kurylo.) In connection with your earlier discussion with viruses, it is my recollection you said that the viruses needed living cells on which to live.

A. That is correct.

Q. Are the fecal coliforms and the fecal Streptococci living cells upon which viruses could thrive?

A. I am sorry, sir, I gave you a wrong answer. I will have to correct it right now. The viruses are only able to multiply in the presence of living tissue cells and, being living tissue cells, that excludes bacteria, since they are not tissue cells. They are biological entities themselves. The virus can be cultivated upon tissue cell cultures of certain of the cancer tissue cells; it can be cultivated in living monkey kidney. If you dissect out the monkey kidney and keep it on a proper oxygenated nutrient solution so it will grow, it will grow on liver tissue cells and it will grow on various other kind of tissue cells that are grown in culture from animals. But unless it is a living animal cell, so far as I know the viruses are unable to multiply.

Q. A living animal cell?

A. Yes, sir, in sterile tissue cultures. They call them tissue cultures.

Q. Would the --

A. That is the human and animal viruses. That doesn't apply to the plant viruses. They have to have living plant cells.

Q. Would the waste which reportedly comes from the packing house areas here be such living tissue cells?

A. Under the conditions that these wastes are expelled by the packing houses, I am quite sure that none of those tissues are able to multiply and grow in the sewage that is present.

Q. All I am looking for is facts. We are looking for answers.

A. It takes a fairly high oxygen level and we have quite a trouble with our tissue cells keeping them sterile because they don't like -- don't grow too well when they are contaminated with bacteria.

MR. KURYLO: I have no further questions.

CHAIRMAN SAMSON: Any further redirect?

MR. EDELMAN: No, sir.

CHAIRMAN SAMSON: Any further recross?

MR. BROWN: No, sir.

MR. SCHOENLAUB: I have one question.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Clark, would you comment on a statement to the effect that virus would not survive the treatment given by modern water treatment procedures, referring to the treatment given to water at water plants similar to the one in St. Joseph, Atchison, Leavenworth, and Kansas City?

A. As I recall my testimony, I said that while I did not think the chlorine level might be high enough to kill, that I thought it was a reasonable assumption to say that they would be absorbed or occluded in a gelatinous filter in the coagulation basin and probably be removed by filtration through the alum flock that is on the sand filter. And I believe I also added to that that I was not an expert in this subject and therefore I was expressing just an opinion and not giving evidence on that subject.

MR. SCHOENLAUB: Thank you.

CHAIRMAN SAMSON: Any further redirect?

You may be excused.

(Witness excused.)

CHAIRMAN SAMSON: I sort of felt that we might proceed here until about 5:15. It is just a few minutes of 5:00 now and we can get a little more work done if that is agreeable with you gentlemen, 5:15 or 5:30, whatever is agreeable.

Do you have another witness?

MR. STEIN: Yes. Mr. Metzler.

DWIGHT F. METZLER,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

## DIRECT EXAMINATION

BY MR. STEIN:

Q. May we have your name and address?

A. Dwight F. Metzler, Kansas State Board of Health, Topeka.

Q. You will recall that you were sworn earlier?

A. I always tell the truth.

Q. I know that. By whom are you employed, Mr. Metzler?

A. I am employed by the Kansas State Board of Health as Chief Engineer and Director of its Division of Sanitation.

Q. Have you had any special education or training in the field of sanitary engineering?

A. I hold in addition to my baccalaureate degree in civil engineering from the University of Kansas a graduate degree from that school and one from Harvard. The one from Harvard is in sanitary engineering. My 20 years of experience have been in the field of sanitary engineering, with special emphasis on water supply and water purification.

Q. What is the official state agency in Kansas responsible for overseeing public water supplies for controlling stream pollution?

A. Since 1907 the Division of Sanitation of the Kansas State Board of Health has been the agency for overseeing the quality of public water supplies in Kansas and that streams in Kansas are not subject to pollution which is detrimental to public health, animal, aquatic or plant life.

Q. Has Kansas cooperated with other states in the Missouri Basin in studying pollution of the river and adopting -- well, first that.

A. Yes, it has.

Q. Have they cooperated with other states in adopting a policy for pollution abatement?

A. Yes. And would you mind if I do just a little bit of history here on this to indicate that this is not just a short term interest on the part of the State of Kansas? I think the Board might be interested to know.

MR. SCHOENLAUB: Your Honor, I object to that line of testimony as being irrelevant and immaterial to this proceeding, a history of what is happening in Kansas. This hearing is interested only in what Missouri is doing to Kansas, not what they have done.

CHAIRMAN SAMSON: Overruled. You may answer.

A. My testimony is directed at the interest of the State of Kansas and specifically the Kansas State Board of Health in the quality of water in the Missouri River. Dr. Crumbine, the state health officer there in the early 1900's, was much concerned about the high typhoid fever morbidity and mortality rates throughout the state. He made considerable progress with his staff in the period of 1907 to 1908, 1909 and 1910 in the other parts of the state, but the morbidity rates in the Kansas communities along the Missouri River were of the order of 25 to 30 per hundred thousand per year, the typhoid fever morbidity rates. So Dr. Crumbine and the staff were particularly concerned about this matter and requested a study of pollution, which was done by the United States Public Health Service in 1912 or 1913 by Mr. McLaughlin. And so this now of more modern times, and I assume that this is the point to which the question is directed, Kansas along with the other four lower Missouri River Basin States and the U. S. Public Health Service did agree to make a joint study of the Missouri River from Yankton to St. Louis in 1949, I believe. As its contribution Kansas studied the pollution sources in Kansas and provided laboratory services to evaluate some of the sources of pollution in the State of Missouri. These data were reported and analyzed in a report that I am sure has been referred to previously.

Then in September of 1953 a conference was held with representatives of the states, the other four, and with the United States Public Health Service and I agreed to recommend to the Kansas State Board of Health, that is our governing body, participation in a uniform program for pollution abatement along the main stem of the Missouri River. This was done and the Board adopted the policy at its meeting of December 11, 1953. At that time the policy adopted by the Board for Kansas communities calls for primary treatment of all sewage, the elimination of toxic compounds from the waste discharges, notification of all the cities involved, and a review of the progress at periodic intervals.

Kansas was represented then at the June 1957 conference on water pollution called in this city and those -- the testimony of the State is already a matter of record. In addition Kansas has participated in these more recent studies with the Public Health Service, primarily by providing certain laboratory assistance. That was with the studies that have previously been described from St. Joe to Kansas City.

Q. (By Mr. Stein.) Mr. Metzler, did I understand you to say that the Kansas State Board of Health records have data on the water quality in the Missouri River below St. Joseph since 1907?

A. We actually have data -- I brought along some of it, a pictorial presentation of these data -- since 1913. I would like an opportunity --

Q. Yes. Let's see your pictorial presentation.

MR. STEIN: We ask that this chart entitled "Average Annual Coliform Values" --

A. Atchison, Kansas, 1913 to 1959.

MR. STEIN: -- 1913 to 1959 be marked as Government's Exhibit No. 33 for purposes of identification.

(Government Exhibit No. 33
marked for identification.)

CHAIRMAN SAMSON: What was the year, Mr. Metzler?

A. 1913 to 1935 and there is a gap there and 1946 to date.

Q. (By Mr. Stein.) Will you explain the data on that chart, Mr. Metzler?

A. These data show the results of samples of raw water which were analyzed in our laboratory taken from the Atchison water works intake. In order to keep the number of spots down so that you could follow the general trends, we plotted the averages and each of the points then represents all of the raw water samples, the average of all the raw water samples, that were collected during any one year, with the dates along the bottom of the chart (indicating) from 1913 to 1959, and with the coliforms per hundred milliliters along the vertical axis (indicating). You will see that during the period here of 19 -- I would say, incidentally, that the methods of analysis that we were using in this early period might be subject to some question if interpreted by today's results and probably there is some benefit going to 1917 or '18, although we were running five tube dilutions back even in 1913. The results generally, then, if one were to take a period here from 1917 clear through 1929, the average coliform content of the raw water during that entire period was 12,400 per hundred milliliters. Now, if we go over to a similar period here (indicating), you can see the great increase. This is the 5,000 level (indicating), here is the 20,000 level (indicating), and here you see it is nearly 90,000 (indicating), the average in the year 1950. The results over here (indicating), the average for a like period as compared here (indicating) was 45,900. In other words, there is a four -- has been a four-fold increase in the period 1946 through '59 of what there was in the period 1917 through 1929.

An array of the mean values for coliforms on an annual basis, and I plotted averages here, show that there is a great increase through 1952. This increase in mean value is actually a ten-fold increase and some engineers would prefer to use the mean value as being more significant than the average and it rules out some of these peaks that we have had.

MR. STEIN: I offer this in evidence as Government Exhibit No. 33.

MR. SCHOENLAUB: No objection.

MR. BROWN: No objection.

CHAIRMAN SAMSON: It will be received.

(Government Exhibit No. 33
received in evidence.)

Q. (By Mr. Stein.) Mr. Metzler, I notice there was some change after the regulated stream conditions went into effect on the Missouri River because of the upstream reservoirs. What do your data show, say, for the last five years when the Missouri River flowing past Atchison has been regulated by these reservoirs?

A. I think you are correct in reaching the conclusion that these lower average annual values here are probably due to increased dilution from upstream and have caused the substantial drop in values here. During the period of the five years, this would be July 1, 1954, to July 1, 1959, we collected 217 samples. This would be 12 percent of the days, in other words, during that 5-year period. Of this 8 and 75 hundredths percent of the samples exceeded 200,000 coliforms per hundred milliliters.

Q. Mr. Metzler, do you have a chart showing this?

A. I am sorry, I don't have a chart showing this particular value.

Q. All right.

A. We perhaps should have prepared one. At the hundred thousand coliform level something over 9 percent of the samples, at the 50 thousand coliform level, which would still be up here (indicating) at a pretty high level, 19 percent of the samples had 50 thousand coliforms or more, and 37 and 8 tenths percent of the samples exceeded the 20 thousand.

Q. Mr. Metzler, you have a chart here called "Coliform Concentrations in Raw Water, Atchison, Kansas, 1946 to 1959".

MR. STEIN: I ask this be marked as Government Exhibit No. 34 for purposes of identification.

(Government Exhibit No. 34 marked for identification.)

Q. (By Mr. Stein.) Would you explain the data on the chart?

A. This chart plots again with year and concentration. The coliforms raw water Atchison water works intake. Now, the chart, this black line (indicating) again and again, in order to give you a line of magnitude, here is a hundred thousand, 2 hundred thousand, 250 thousand coliforms per hundred milliliters. These lines actually depict the results from all of the samples which were taken during the period until 1946. In 1946 we began sampling at so much more frequent intervals that we plotted this on two bases. You will notice that there are substantial variations and in every year except two that the maximum coliform concentration reached 240 thousand or more on at least one occasion. And incidentally, this matter of design of a water plant, I don't need to say to this Board that a water plant needs to be designed like a bridge. It is not satisfactory for a water plant to carry the load for 364 days and a half any more than it is for a bridge to.. And so you design a bridge for a maximum load and the same thing is true in water purification. So these maximums are really the significant point to be seen here.

In addition to that, I am sure some of you might be interested in how this is related to river flow. First I had thought of getting a chart for you that would show where the river flow was. Do these peaks (indicating) represent just the high flow in the river? Well, in checking back for these data we found that about half of the peaks occurred when the river flow was up and half of them occurred when the river flow was at normal or below. Well, this doesn't give you any statistical significance and so we did not include that. But I think it is significant that half of these peaks occurred when the river flow was low, this wasn't flush out from deposits in the river or from feedlots or other areas around.

Now, the red line here (indicating) indicates the mean value and again you will see that the mean values have generally increased during this period here about which we are talking, 1955, '56, '57, '58 and thus far in '59 there has been some trend in this direction (indicating) and then perhaps off, this I am not quite sure about. But at any rate, even the mean values are generally well above the 20,000 level here.

Q. Mr. Metzler, as the representative of the official state agency in Kansas that oversees water plant operations do you consider this as a desirable condition in a raw water intake?

A. No, of course it is not. This water is grossly polluted. The raw water is grossly polluted and we have taken every means we know to assist cities in turning out water that is of acceptable quality and is safe for drinking. This means unusual precautions. I know of no place in the country, other than along the Missouri River and specifically in these Kansas plants, where you provide two days or so of plain sedimentation clear ahead of all the rest of the treatment process. Anyone coming from other parts of the country looking at this immediately wonder what in the world has happened out here. I am sure that the engineering member of the Board will confirm that this is a very unusual situation which so far as I know is not duplicated anywhere other than along the Missouri River in these downstream towns.

Q. Mr. Metzler, your agency gets reports and analyzes water at the intake of the water treatment plants in your state, is that correct?

A. That is correct.

Q. Does any water treatment plant in your state have water where the coliform count is as high as at Atchison?

A. Yes, on the basis of the data which we have, Atchison and Kansas City. Kansas City has raw water which is at least of this order of magnitude of loading. But otherwise than along the Missouri River we don't have any water plants that are loaded at --

Q. These are the only two?

A. These are the only, these three plants along the Missouri are the only ones in Kansas that have anywhere near this kind of loading.

Q. Are these data from Atchison supported by data from downstream water works?

A. Yes, they are. In fact, we have daily data over a long period of time at the Kansas City, Kansas, water works intake and there is an article published in one of the recent issues of the Journal of the American Water Works Association showing that the average annual coliform concentration of the raw water at Kansas City, Kansas, has increased twelve-fold, that is from a little over 5,000 per hundred milliliters to 72,000 per hundred milliliters, in a period of 30 years.

MR. STEIN: At this point I offer the chart titled "Coliform Concentrationsin Raw Water" as Government Exhibit No. 34.

CHAIRMAN SAMSON: Any objections?

MR. BROWN: No objection.

MR. SCHOENLAUB: No objection.

CHAIRMAN SAMSON: It will be received.

(Government Exhibit No. 34
received in evidence.)

Q. (By Mr. Stein.) Mr. Metzler, did you personally ever inspect the raw water coming into the Atchison water plant?

A. I have.

Q. What did you see?

A. Well, during our occasional routine checks, and we are required to make at least two of these a year on all surface water plants, and both I and my associates have seen floating material on the --

CHAIRMAN SAMSON: Mr. Metzler, would you fix the date of that, dates, as near as you can?

Q. (By Mr. Stein.) When was the last time you saw that?

A. Well, I am sure counsel would like these dates and if you want me to look them up, I will be glad to do it. The last time --

CHAIRMAN SAMSON: Well, just generally.

A. May I give you some idea of the period of time over which these visits have extended?

CHAIRMAN SAMSON: Very well.

A. My first visit to the Atchison water plant was in 1941. And since that time I expect that I have visited that plant eight or ten times. The most recent has been within the year. During those visits I have been struck with some of the operating difficulties which Mr. Weatherford discussed with you this morning. I have seen the problems of floating material on the raw water basins. On one occasion I was there when they were cleaning out one of their -- cleaning the sewage from one of their settling basins and actually this had a strong decayed sewage odor, more commonly associated with the folks who clean out septic tanks than at a modern water purification plant. There also have been problems of tastes and odors which I have discussed and have observed and tasted and smelled along with Mr. Weatherford, who is the operator there. I should say, incidentally, that improvements to the water treatment facilities there have been made from time to time, both at our urging and at the city's desire, in an effort to combat particularly these taste and odor problems and to provide for adequate chlorination. The real danger at Atchison and at other cities which use raw water with this degree of contamination is the danger that something will happen to interrupt chlorination. The only thing that separates the disease organisms from the consumer is this curtain that is provided or this protective barrier that is provided by chlorination. Sudden changes in chlorine demand, increases, fluctuations, occur when suddenly the dosage of chlorine must be doubled or even more in a matter of a few minutes or the chlorine will be completely used to satisfy the chlorine demand and there will be none left to do the job of killing the disease-producing organisms. This means, then, that not only must there be an operator on hand around the clock, but this means that that operator must be especially alert. I didn't hear all of Mr. Weatherford's testimony this morning and I don't know whether he told you about having suddenly to rig up five drums of chlorine when his capacity was exceeded and bubble this into the basins in order to meet this because it was too quick to do anything else. He had no time to do anything else. This doesn't give you a very big margin of safety.

Q. (By Mr. Stein.) Mr. Metzler, what time of the year is the most critical in treatment of Missouri River water?

A. On the basis of my experience with the river the winter would be the most critical time of treatment. There have been times when the river was frozen from St. Joe to Atchison and this means essentially that the wastes are flowing down in a closed conduit to be picked up at Atchison. This is shown by substantial oxygen depletions. We have seen oxygen depleted to about four tenths of saturation, for example.

CHAIRMAN SAMSON: May I interrupt here? Mr. Metzler, will it be inconvenient for you to stay over tonight and continue in the morning?

THE WITNESS: It is, as a matter of fact, but I think my convenience has to take second choice here in the interests of the Board and the attorneys.

MR. STEIN: Mr. Chairman, we just have a few more questions to ask of Mr. Metzler, if we may.

CHAIRMAN SAMSON: Very well. How do you feel about it, Mr. Brown? I suppose you are like all the rest of us,probably tired.

MR. BROWN: Well, whatever you want to do suits me. It is perfectly all right. If he wants to get away, I have no objection.

CHAIRMAN SAMSON: Fine. All right, then, proceed.

Q. (By Mr. Stein.) Does Kansas have any estimate of the damage to its people through pollution coming from Missouri?

A. Certainly we have no dollar value on this damage. There is no doubt but what our water treatment plants have been required to expend substantial amounts of money that would have been unnecessary had the wastes from upstream cities been treated. There is no doubt but what the polluted condition of the water also requires daily chemical usages well above what would be required in a stream less polluted, more chlorine dosages, use of activated carbon, and so forth, especially to combat taste and odor, color, as well as the bacterial loadings. There is the use, which you have heard, of this heavily sewage polluted stream for recreational purposes, which certainly is hazardous. Fishermen have complained to us about the fouling of their nets and one of our former board members, a very avid duck hunter, quit hunting ducks along the Missouri River because he found it so difficult to clean the grease, and so forth, off his gear when he returned with his ducks. And, of course, there is also the problem, not very great as yet, probably increasing, as supplemental irrigation moves eastward, which comes from those people who will be pumping water from the Missouri River for supplemental irrigation of farms. All of this is a cause for damage

Now, at its meeting -- at its last meeting, at its July meeting, our State Water Resources Board, which is the over-all water planning, water coordination agency for the State of Kansas, asked me to review the situation on the Missouri River and then made a direct charge to me and to the Board to point out to this hearing board the problems which are caused by the pollution, the damage to Kansas interests, and the necessity for taking a firm stand to get it abated.

Q. Talking about getting this pollution abated coming down from Missouri, what progress has Kansas made in the abating of pollution of the Missouri River?

A. Well, the Missouri River, in addition to the pollution which occurs along it, has two principal sources of tributary pollution. One is the Floyd River, which comes in at Sioux City, Iowa, the other is the Kansas River, which comes in at Kansas City. The Kansas State Board of Health, in cooperation with other agencies, made a study of pollution along the Kansas River, and for the Board members, the Kansas drains the northern half of the State of Kansas, a substantial part of southern Nebraska, and a little bit of northeastern Colorado. And this study revealed serious pollution along the Kansas River, both in Nebraska and in Kansas. The Kansas State Board of Health carried out public hearings, adopted a policy, established a pollution abatement time schedule, and has cleaned up the pollution on the tributary down to the city limits of Kansas City, Kansas. Kansas City, Kansas, along with Kansas City, Missouri, is dumping untreated sewage into the Kaw and this still constitutes a very major source of pollution. Kansas City, Kansas, and I have a meeting tomorrow with the commissioners there, is making definite progress to abate this pollution. It is now spending three million seven hundred thousand dollars, which its citizens voted, to build interceptor sewers and buy treatment plant sites. It has an engineering study under way; it made one in 1953 but it is necessary now to bring this up-to-date. It has good cooperation from the industries there. They are giving excellent support to the program. The matter to be discussed tomorrow is the establishment of a sewer service charge. The commission in Kansas City, Kansas, has a proposal before it and we expect that some progress will be made toward adopting a method of financing the needed -- the remainder of the needed treatment works program.

At Leavenworth, I believe it is clear by now to the members of the Board that the City of Leavenworth, the Fort there, Fort Leavenworth, the prison, and the Veterans' Administration all dump untreated sewage into the Missouri River. Again in 1953 the three federal agencies said as a matter of policy we will cooperate with the city. If the city will build the treatment facility we will contribute our sewage to it and help pay the cost thereof. A facility is definitely programmed to go under construction there in one year and the reason for this delay of one year is at least partially the problems of Congressional appropriation and coordinating these with three federal agencies. You have already heard that at Atchison plans have been completed; we have approved them. Atchison has the money and can let the contract at any time it chooses. I think actually it plans to let this in September.

Q. Mr. Metzler, I would like to call your attention now to Government Exhibit No. 25 and ask if you are familiar with the Missouri Basin Water Quality Objectives as shown on that exhibit?

A. I am familiar with the Missouri Basin Water Quality Objectives and while that exhibit is being secured, if I recall correctly, this shows the bathing standards at a thousand and the drinking water -- the raw water quality standards at five thousand.

Q. Did you participate in the development of these standards or objectives?

A. Yes, I did, as a representative of the State of Kansas, along with representatives from the other four states and the Public Health Service. I believe again some preliminary drafts had been circulated, but as I recall this was in September, 1953, at Omaha that for the State of Kansas I said this looks reasonable to us. Well, we discussed the water supply uses downstream and the objectives which would be necessary in order to not adversely affect these uses. So I have -- I am familiar with these and have seen them and did participate in developing them.

Q. Do you care to say what the basis of assigning the numbers to these were or not?

A. I would be glad to. There is certainly nothing magic about these numbers. These were based on some very widely accepted studies across the country. We in Kansas had already adopted these for our own general guidance on our own water supplies and these were, so far as the 5,000 limit, set forth in the Public Health Service Drinking Water Standards. The 1,000 limit is backed up by considerable research, some of it done by the Conference of State Sanitary Engineers, some of it by the American Public Health Association and some of it by the United States Public Health Service.

MR. STEIN: Thank you, Mr. Metzler. We have no further questions.

CHAIRMAN SAMSON: You may cross-examine.

MR. SCHOENLAUB: No questions.

CROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Metzler, I just have a few questions. Let's get back to your exhibit. Take that 25 off and let's get back to 33 and 34. You say there is no correlation between those peaks and the high water periods?

A. That is correct.

Q. And you have studied that yourself and know that personally?

A. I have studied this myself.

Q. All right. Now, taking the Exhibit 33 there, you show a decided break-off that appears at the end. Is that along about '55, '56?

A. This break-over here (indicating)?

Q. Yes.

A. This last value is for the first six months of 1959. These are the data from January 1 through June 30, 1959.

Q. I see. Based on your study, which has been quite extensive, you apparently have realized that the industries here in St. Joseph have in the past year or two themselves made material reductions in the waste they put in the river?

A. I have heard this said and I am sure this is true.

Q. It will be documented. For instance, --

A. Well, I think they are to be commended for taking the --

Q. Do you think that sudden decline there might be a reflection of the diminution of the amount of waste from these industrial sources?

A. I wish I can say this, Mr. Brown, and I am sure it might be possible. This sudden decline that we are talking about is of the order of magnitude of about 4,000 or so, a reduction from 40,000 to about 36,000.

Q. Yes, but there is a plateau there of a year or two where there has been not too great a change and I am just suggesting that perhaps that is the reflection of what has been done up here in St. Joseph. There must be some reason for it.

A. Well, of course, this variation, Mr. Brown, is substantially less than some of these other variations that have occurred here and we just don't have enough data so that I can give you an authoritative answer.

Q. Let me ask you another question. Your public health records, I presume, cover the towns of Kansas back for a number of years?

A. Yes, sir.

Q. Do you have mortality records on your towns?

A. Yes, sir.

Q. Do you have anything, any records on epidemics of various kinds?

A. Yes.

Q. Is there any correlation whatsoever between the mortality rates and sickness and health at Atchison and those peaks in either one of those exhibits or the fluctuations in either exhibit?

A. I don't think that our data are sensitive enough, probably, our vital statistics are sensitive enough to give authoritative information, but you will recall my mentioning the thin protection which is afforded here and that chlorination is the only one. May I tell you, sir, about what happened to us at another Kansas community when this barrier was ruptured for a matter of only a few hours and we had 10,000 --

Q. I am not interested. You wanted to get away and I am staying. I am interested in pursuing my own question. I don't want to be rude to you. If you want --

A. I think the members of the Board would be interested --

Q. I am not interested. If the Board is, they can say so and you can go right ahead and I will wait.

A. All right, you ask your question.

Q. What I want to know is do you have any correlation between your health records at Atchison and these fluctuations and peaks whatsoever?

A. We do not.

Q. There is nothing to indicate, then, that the sudden increase in the pollution of the river in any way affected the health of Atchison, Kansas?

A. We have no vital statistic to show that this increase in pollution caused any water-borne disease from the public water supply of Atchison.

MR. BROWN: That is all. Thank you very much.

CHAIRMAN SAMSON: Any questions by the Board?

MR. POOLE: I have a couple.

CHAIRMAN SAMSON: Mr. Poole.

MR. POOLE. I don't like to prolong this unnecessarily, everybody wants to get away, but this is the first evidence I have heard about the sewage treatment program of the Kansas towns and naturally I have been quite interested in it.

Q. (By Mr. Poole.) Now, if I followed you -- this morning the Atchison situation was taken care of. If I followed you, now, there is an agreement between the three federal agencies in Leavenworth and the town of Leavenworth that their sewage will be discharged to the town or city of Leavenworth when it builds a sewage treatment plant and that is contemplated for construction next year. Are the plans completed and approved?

A. The city made -- had an engineering study and a complete set of plans prepared in 1953 on this and, as a matter of fact, was ready to go then, but delayed because upstream cities were showing no inclination to provide treatment. As a result, these plans require rather extensive revision and updating and the engineers have been authorized to undertake this work. They have been held up until now by lack of data, lack of authority particularly from the Department of Defense, for the data which they needed from Fort Leavenworth.

Q. Do you have any peculiar arrangements as to financing in Kansas or is this the type of job that can go without a referendum?

A. This city, again, is in the same population range as Atchison and you heard the City Manager this morning tell that we had a choice -- that Kansas communities can issue either general obligation bonds, which requires a referendum for a project of this size, or they can issue revenue bonds with an opportunity for a public referendum if requested by a small percentage of persons signing a petition. Actually the citizens of Leavenworth or the city officials at Leavenworth show an inclination to want to go to a bond election. However, we have no reason to think that this will fail. We have a particularly good record of not losing bond elections on sewage treatment in Kansas.

Q. Is Leavenworth under order by the Kansas State Board of Health --

A. It is.

Q. -- to build a sewage treatment plant?

A. It is under order to have one under contract by January 1, 1960, and since it apparently will not make it by this time there is a matter here for the Board to decide whether it wants to prosecute or actually allow this extra six or eight months which apparently will be required in order to get the federal financing straightened out.

Q. But as of this moment you have little fears that it will go under construction during 1960?

A. There is no doubt but what it will, in my mind.

Q. Now, I would like --

A. I think it will either go -- if the federal agencies can't get on the wagon I think it will go without them. They will have to build their own.

Q. You indicated that Kansas City, Kansas, was spending between three and four million dollars now on interceptors and a plant site. Could you give us a little more definitive information? I presume that is a rather sizeable job.

A. Yes.

Q. And there will be several contracts. As to the time table for Kansas City, Kansas?

A. Well, Kansas City, Kansas, is now developing the -- the problem there, incidentally, is somewhat different than it is here in that Kansas City, Kansas, has an equivalent population contributing to the municipal sewers of about 650,000, and so these industries now and the city's consulting engineers are conducting extensive plant survey, sampling program, waste measurement program to determine how -- what design requirements will be needed. Also, as I mentioned, this service charge matter is under active study and the commission has a specific recommendation before it now. It is a little -- while the city promised, again, to be under contract by January 1, 1960, and is also under order from the Kansas State Board of Health to do it, it is apparent it will not make that date. It would seem to me reasonable to hazard an opinion that it could make this date by about 12 to 15 months later.

MR. POOLE: Thank you. That is all.

CHAIRMAN SAMSON: Any other questions by any other members of the Board?

MR. KURYLO: I have several questions.

Q. (By Mr. Kurylo.) You mentioned on direct examination that back about 50 years ago there was an effort under way to reduce typhoid fever in the western part of the State of Kansas. Would you mind elaborating on that if you have the information?

A. Well, my information is based on my reading of the biennial reports of the Kansas State Board of Health.

Q. Which are official records?

A. Which are official records.

Q. And open to inspection?

A. And are open to inspection and we have a copy in the offices on the fifth floor of the State Office Building in Topeka. The typhoid fever morbidity rate was high in the entire State of Kansas in the period 1900 to 1905 or '06, and at this point, and much of this was water-borne typhoid beyond a doubt --

Q. Let me ask you at this point, was water positively incriminated as the cause?

A. Yes.

Q. In all cases?

A. No. This is the reason I said part of this is water-borne typhoid and in some cases the water was actually incriminated in public outbreaks. Then the State Health Department, State Board of Health, undertook a program of improvement both on sewage treatment and on public water supplies. This was about the time that chlorination became known and improvement was made in the rest of the state much faster than it was in Kansas City, Kansas, Atchison, and Leavenworth. And it was for this reason that I emphasized Dr. Crumbine's request for a study of the Missouri River in 1912.

Q. Then as I understand your statement, some of the typhoid fever cases incriminated water positively?

A. Yes.

Q. Others did not?

A. That is correct.

Q. But water might have been the cause?

A. The majority of the cases did not have good enough epidemiologic evidence to know where these were from, but it is significant that with the advent of sewage treatment, the elimination of stream pollution, the improvement of public water supply treatment, that this rate that I have talked about dropped to ten in 1914 and was down to a much lower level than that a few years later.

Q. On cross-examination you started to mention what apparently was a recent experience with respect to a breakdown in a water treatment plant. Would you mind elaborating on it?

A. At Newton, Kansas, in the fall of 1942 sewage was permitted to -- chlorination was off, sewage got into a water main. This main -- this point happened to be close to the edge of the city as the main came in from the well fields. The water was delivered to the customers and 3,000, slightly more than this, of the 10,000 people became acutely ill with bacillary dysentery. This could have been prevented had either the sewage been kept out or had the water supply been adequately chlorinated.

MR. KURYLO: I have no further questions.

CHAIRMAN SAMSON: Any further redirect?

MR. STEIN: No, sir.

CHAIRMAN SAMSON: Any further cross?

CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Where did the sewage come from?

A. It came from a cross connection, we would call it, from a yard hydrant which was tied in -- which was drained to a sanitary sewer; sanitary clogged, backed the sewage up to the base of the yard hydrant and flowed through the weep hole of the yard hydrant directly into the water main of the city.

Q. Well, its flow to the customers wasn't a very great distance, then, was it?

A. The distance after it was contaminated until it reached the customers?

Q. After it flowed into the water main.

A. The distance was short. It was on one side of town and this spread throughout the town. I suppose the farthest distance might have been two miles or two and a half miles.

Q. What has been the typhoid record in Atchison the past year?

A. I am sure that as far as typhoid fever is concerned from the public water supply we have no problem. I think there is some reason to be concerned about--

Q. That is fine.

A. -- some of the other agents that have been mentioned.

(Witness excused.)

CHAIRMAN SAMSON: Gentlemen, we stand adjourned until 9:00 o'clock tomorrow morning.

SECRETARY AYERS: In the Crystal Room.

CHAIRMAN SAMSON: In the Crystal Room.

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WHEREUPON, the hearing was adjourned until 9:00 o'clock a.m. of the following day, at which time the following further proceedings were had and entered of record, to-wit:

- - -

MORNING SESSION, THURSDAY, JULY 30, 1959

CHAIRMAN SAMSON: Good morning, gentlemen. The hearing will now convene.

As counsel well knows, this Board is here to hear all the evidence and take into consideration all the facts and all the arguments. It certainly isn't the purpose of the Board to rush nor to hurry any of the parties nor counsel for any of the parties. The Chair just as a matter of, shall I say, curiosity, if counsel are so disposed, would like to hear from counsel as to, well, the Government how much more evidence, if you care to comment, and from the other parties.

MR. BROWN: You mean you want to know what evidence we propose to put on?

CHAIRMAN SAMSON: Well, can counsel state approximately how much time?

MR. BROWN: I would think for industry it would not be over an hour at the most, if that.

CHAIRMAN SAMSON: I see.

MR. BROWN: Probably much shorter.

CHAIRMAN SAMSON: I see.

How about the Government?

MR. BROWN: Mr. Schoenlaub, I don't know what he will want.

MR. STEIN: We need an hour.

CHAIRMAN SAMSON: About an hour. I see.

I see Mr. Schoenlaub isn't here right now. Possibly we might wait a minute or two.

MR. POOLE: Yes, we will have to wait on him.

(Off the record.)

CHAIRMAN SAMSON: Gentlemen, we may now proceed.

We would like to check the appearances again, and in that connection I would like to have Mr. Ayers check with you gentlemen on the appearances that are noted here of record.

So, Mr. Ayers, if you have any problem in that connection, will you kindly recheck it at this time.

SECRETARY AYERS: I have the Missouri Department of Health and Welfare represented by Jack K. Smith.

Kansas State of Board by Dwight F. Metzler.

City of St. Joseph, Missouri, by Fred E. Schoenlaub.

I have no appearance for Albers Milling Company.

American Cyanamid Company by R. A. Brown and Harry A. Bostrom.

MR. BROWN: Bostrom. He is no longer here.

SECRETARY AYERS: But there was an appearance?

MR. BROWN: He was here. He is their New York general counsel and was here for the first two or three days.

SECRETARY AYERS: Now, Mr. Brown, there was a question raised. Are we correct in yours as R. A. Brown?

MR. BROWN: Yes. You are talking about the Junior. I used to be Junior and I dropped the Junior at last.

SECRETARY AYERS: The Chairman raised that question.

CHAIRMAN SAMSON: Would you like to have the record, then, show that you are a Junior no longer?

MR. BROWN: I have not been for several years, but I have a son who is now Junior and there is constant confusion.

CHAIRMAN SAMSON: Very well.

SECRETARY AYERS: Anchor Serum Company, R. A. Brown.

MR. BROWN: Correct.

SECRETARY AYERS: I have no appearance for Archer-Daniels-Midland Company.

MR. DON K. SPALDING (Executive Vice-President St. Joseph Stock Yards Company): That is right. Archer-Daniels-Midland have had a man present at the meeting. They are not represented by counsel.

CHAIRMAN SAMSON: What was the name of the man who was here?

MR. SPALDING: What was his name, Bob?

MR. BROWN: Chris Harris.

MR. SPALDING: He is Stratton-Theis.

MR. BROWN: Tom Carbry was here originally for them.

MR. EDELMAN: Does he want to enter an appearance, do you know?

MR. BROWN: I doubt it.

MR. SPALDING: No.

SECRETARY AYERS: Then our records will show no appearance for Archer-Daniels-Midland Company. We leave it that way.

CHAIRMAN SAMSON: Very well.

SECRETARY AYERS: Armour and Company by R. A. Brown.

MR. BROWN: Right.

SECRETARY AYERS: Bartlett and Company, J. T. Carbry.

MR. BROWN: Carbry, C-a-r-b-r-y.

SECRETARY AYERS: Yes. Consumers Cooperative by Max Wasserman and Tom Cary, the chief engineer.

Dannen Mills by George O. Lines and R. A. Brown.

Kees-Lyon Oil Company, I have no appearance noted.

MR. SPALDING: That is correct.

SECRETARY AYERS: St. Joseph Feed and Supply Company, no appearance noted.

MR. SPALDING: Correct.

SECRETARY AYERS: St. Joseph Power and Light Company, Charles Wilcox.

MR. SPALDING: Right.

SECRETARY AYERS: St. Joseph Stock Yards Company, R. A. Brown.

MR. SPALDING: Correct.

SECRETARY AYERS: Seitz Packing Company, R. A. Brown.

MR. SPALDING: Correct.

SECRETARY AYERS: Stratton-Theis Grain Company, Christopher Harris.

MR. BROWN: Correct.

SECRETARY AYERS: Swift and Company Packing Plant, R. A. Brown.

MR. BROWN: Right.

SECRETARY AYERS: Swift and Company Fertilizer Plant, R. A. Brown.

MR. BROWN: Correct.

SECRETARY AYERS: Terminal Warehouse of St. Joseph, R. A. Brown.

MR. BROWN: Correct.

SECRETARY AYERS: Union Terminal Railroad, Charles Wilcox.

MR. SPALDING: Right.

SECRETARY AYERS: That completes it.

MR. CLARE: Mr. Chairman, isn't the appearance for the Consumers Cooperative Tom Cory instead of Cary? I understood you to say Cary.

SECRETARY AYERS: Yes, it is C-o-r-y. Yes, that is correct.

CHAIRMAN SAMSON: You have now verified your records on appearances, have you, Mr. Secretary?

SECRETARY AYERS: I have.

CHAIRMAN SAMSON: Thank you very much, Mr. Ayers.

Is there anything further now before we go to work this morning?

All right, you may proceed.

MR. STEIN: Mr. Smith, Mr. Jack Smith.

JACK K. SMITH,

called as a witness on behalf of the Government, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. STEIN:

Q. Will you state your name and address for the Board?

A. Jack K. Smith, 813 Clayton, Columbia, Missouri.

Q. If your memory is long enough, Mr. Smith, you will recall that you were sworn earlier in the proceedings?

A. Yes, sir.

Q. What position do you hold?

A. Executive Secretary, Missouri Water Pollution Board.

Q. In general terms what is the function of that board?

A. Under the broad -- Of the board?

Q. Yes.

A. It is charged with the responsibility of the control of pollution in the State of Missouri.

Q. Do you have any special education or training in the field of sanitary engineering?

A. Yes, sir.

Q. Will you state what that has been?

A. B.S. civil engineering, Georgia School of Technology, M.S. in civil engineering, sanitary option, Missouri University.

Q. Have you as part of your official functions considered the problem of pollution control in the Missouri River in the St. Joseph area?

A. Yes, sir.

Q. Has your state agency taken any action toward that problem?

A. Yes, sir.

Q. Will you describe what that action has been?

A. In cooperation with the Public Health Service and the States of Kansas, Nebraska, Iowa, South Dakota, surveys have been made beginning in '49, I believe, and reported in '53, and through joint action with the other states a comprehensive program adopted and enacted at the same time. In other words, steps leading to remedial action have been on a uniform basis with the other states.

Q. On the basis of your study are you familiar with coliform counts, bacteria counts, and other indicia of pollution in the river?

A. Yes, sir.

Q. Do you and does your board consider that the Missouri River below St. Joseph is polluted and unsafe for swimming, fishing and boating?

A. Yes, sir.

Q. Have you taken any action concerning discharges from the municipality of St. Joseph and the industries named in this notice to try to get that correct?

A. Yes, sir.

Q. What has that action been? And we would like you to be specific, if you can, with dates.

A. I will need to refer to my notes because that spreads over some seven years.

Beginning June 24, 1952, Burns & McDonnell Engineering Company for the City of St. Joseph prepared plans for sewers serving the Rosecrans Memorial Airport. We advised the engineers that within the next few years primary treatment of sewage before the discharge to the Missouri River would be required.

On April 15, 1953, in a report on review of plans and specifications the City of St. Joseph was advised to design extensions to their sewer systems as sanitary sewers instead of combination sewers in newly developed areas.

On July 21, 1953, in a report on plans and specifications for sewer extensions in sewer district No. 134 the city was advised as follows:

"It is the opinion of the Division of Health that the City of St. Joseph will be required to provide primary treatment of their sewage in the future. It is felt that all future sewer extensions should be designed as sanitary sewers and that every effort be made to eliminate storm water from the system."

August 31 --

CHAIRMAN SAMSON: Just a minute. May I interrupt you just a moment?

A. Yes, sir.

CHAIRMAN SAMSON: Where is sewer district No. 134?

A. I can't tell you. Somewhere within the city limits of St. Joseph.

CHAIRMAN SAMSON: Very well, proceed.

A. August 31, 1953. The Division of Health in a report on a long range sewerage plan for St. Joseph, Missouri, prepared by Black and Veatch, made the recommendation that the city plan to include interceptor sewers, lift stations and treatment works in the immediate future development program.

March 3, 1954. The Division of Health was advised by the Public Health Service that lower Missouri River Basin States were in agreement that primary treatment of sewage and industrial wastes would be required prior to discharge to the Missouri River and that realistic planning and financing for construction should be instigated at an early date.

On March 3rd and 4th the City of St. Joseph, The Mokin Products Company, Anchor Serum Company, Armour and Company, Consumers Cooperative, St. Joseph Stock Yards Company, Swift and Company, and Lederle Laboratories were advised that the states in the lower Missouri River basin had agreed that primary treatment of sewage was essential to protect the Missouri River against pollution and a recommendation was made to provide for primary sewage treatment in any future sewage improvement program.

In March '54 the city was advised concerning requirements of sewage treatment and requested to report progress to the Division of Health in order that joint progress reviews of abatement progress could be made with other states in the basin.

March 8, 1954. Mayor Stanley I. Dale, St.Joseph, Missouri, requested information regarding the type of treatment recommended or required prior to the discharge to the river. This letter also advised that the sewer proposal was defeated--and that was a proposal voting on sewers only--was defeated in November and advised that a sewer program might be submitted to the voters within the next year.

December 30, 1954. The officials of St. Joseph, Missouri, were advised by the Division of Health that extensions of combined sewers would not be approved, but that sewers carrying sanitary sewage only could be connected to the present combined sewer system. The city was further advised that the Division of Health would expect all cities contributing to interstate pollution of the Missouri River to meet the dates of January 1, 1957, for completion of preliminary plans and arrangements for financing of abatement works and January 1, 1959 for the awarding of construction contracts for abatement works in keeping with agreements by the water pollution control agencies of the Missouri River Basin States.

It was further recommended that the city proceed at once with preliminary plans and cost estimates for interceptor sewers and sewage treatment works and that no bond issue for sewer extensions be presented to the voters until they had been advised regarding the estimated cost and time schedule for sewage treatment facilities. Failure of Missouri cities contributing to interstate pollution to comply will necessitate that we request the Public Health Service to proceed with enforcement procedures.

December 30, 1954. The Mokin Produce Company was advised of the dates of January 1, 1957, and January 1, 1959, as --

CHAIRMAN SAMSON: Who was that, Mr. Smith?

A. M-o-k-i-n Produce Company -- and January 1, 1959, as dates established for completion of financial arrangements and the start of construction of abatement works respectively.

On January 31, 1955, Lederle Laboratories, Anchor Serum, Consumers Cooperative, Armour and Company, St.Joseph Stock Yards Company, and Swift and Company were notified of the dates January 1, '57, and January 1, '59.

CHAIRMAN SAMSON: What is the date of that notification, Mr. Smith?

A. January 3, 1955.

CHAIRMAN SAMSON: Thank you.

A. Again as the dates established for arranging financing and beginning construction of abatement works, respectively.

February 10, 1955. The Division of Health was advised by the Public Health Service to report on current status for abating interstate pollution originating from St. Joseph.

February 28, 1955. A discussion was held with the city officials regarding needs and progress toward pollution abatement. The Division of Health, the Kansas State Board of Health and the Public Health Service were represented at this meeting.

March 14, 1955. The Common Council of the City of St. Joseph by council resolution resolved to make every effort to meet the schedule of pollution abatement referred to in the Division of Health letter of December 30, 1954, and resolved to submit periodic progress reports on January 1st and July 1st of each year following the adoption of the resolution.

March 16, 1955. The city was advised to cease dumping garbage into the river.

April 5, 1955. In replying to the city's request to review a report prepared by the citizens' bond committee of St. Joseph, Missouri, the Division of Health recommended that the city proceed to obtain an engineering report on pumping, interceptor and sewage treatment before holding a bond issue in order that voters would be aware of the ultimate cost of the sewage improvement program. The citizens' committee had recommended including $50,000 in the bond issue for the purpose of obtaining a preliminary design and cost estimates for interceptor sewers and primary sewage treatment plant.

April 17, 1955. The resolution of March 14, 1955, of the City Council supporting the dates of January 1, 1957, and January 1, 1958, were submitted to the Division of Health.

April 8, 1955. Mayor Stanley I. Dale replied to the comments on the citizens' committee proposal and as a result a conference was set for May 24, 1955.

May 24, 1955. As a result of correspondence and conference held on this date the city proceeded to instruct their engineers to prepare a supplemental report covering the interception, pumping and treatment of sewage prior to submitting a bond issue for sewer repair and extension to the citizens of St. Joseph.

July 1, 1955. The Division of Health was advised by Mr. Glen J. Hopkins, Public Health Service, that a representative of Black and Veatch, consulting engineers for the City of St. Joseph, had contacted his office in regard to abatement needs and background information for the St. Joseph report being prepared by that firm. Information was given to the firm in this regard and reported to the Division of Health.

October 1, 1955. A report prepared by Black and Veatch covering interception and treatment of sewage was reviewed and comments submitted to the engineers.

November 2, 1955. The supplemental report covering interception, pumping and treatment of sewage for the City of St. Joseph was approved by the Division of Health and Plan No. 3 was recommended for adoption by the city. Again the Division of Health advised that financing of the project should be arranged before January 1, 1957.

November 3, 1955. The Division of Health was advised by Mayor Stanley I. Dale that he personally favored Plan No. 3, that the report had been brought to the attention of the voters through the press, radio and television, and that the city planned to present a bond issue to assure financing to the voters in December, 1956.

March 8, 1956. The Division of Health reported on garbage disposal and recommended against discharging domestic garbage to sewers and against flushing feeding pens to the old channel of the river.

March 26, 1956. A report on garbage disposal for the City of St. Joseph was transmitted to the Division of Health, in which it was recommended that a comprehensive plan be developed to provide sanitary garbage disposal and that refuse from the stockyards bedding area be disposed of by sanitary land fill instead of by discharge to the municipal sewer system.

July 27, 1956. The city requested to be considered for a federal grant for sewage works construction and was advised that as soon as application forms were available they would be supplied to the city.

August 21, '56. The Division of Health approved plans and specifications for sewage improvements and repairs to the existing combination sewer system.

November 26, 1956. The city was furnished the necessary forms for completing application for federal grant under Public Law 660.

January 18, 1957. The Division of Health requested information from the city regarding the status of their filing of an application for federal grant and on January 24th was advised by the city that they would appreciate advice concerning those portions of the project eligible for consideration under the federal grant program.

January 25, 1957. An inspection of garbage disposal revealed that leavings from the hog feeding were no longer flushed to the old river channel. The remainder of domestic garbage was still discharged to the sewers.

February 8, 1957. The city was advised concerning the completion of the application for a federal grant.

February 21, 1957. The Division of Health was advised by the Public Health Service that a conference pursuant to Public Law 660 would be held at St. Joseph, Missouri, on June 11, 1957.

March 14, 1957. The city heard a proposal by Municipal Service Company regarding the financing and construction for sewage treatment facilities. Representatives of the Division of Health were present when the proposal was presented.

April 4, 1957. The Division of Health was advised by the city that garbage and manure were no longer being discharged to the municipal sewer and that equipment for sanitary land fill method of disposal had been authorized.

April 2, 1957. The Terminal Warehouse was requested to discontinue discharge of some 6,000 to 10,000 pounds of egg shells per day to the sewer which empties into the Missouri River.

May 21, 1957. City officials and stock yards --

CHAIRMAN SAMSON: Mr. Smith, will you please repeat what you said as to April 2, 1957, as relates to the Terminal Warehouse?

A. Yes. They were requested to discontinue the discharge of 6,000 to 10,000 pounds of egg shells per day to the sewer which empties into the Missouri River. This they did. That was discontinued.

CHAIRMAN SAMSON: Thank you very much.

A. May 21, 1957. City officials and stock yards industries informed of conference under Public Law 660 to be held June 11, 1957.

June 11, 1957. Conference held at St. Joseph under Public Law 660. The Division of Health, the Missouri Conservation Commission, and the Division of Resources and Development presented statements concerning the pollution from the St. Joseph area and its various effects. The conferees made the following recommendation:

"1. That the city submit the financing of the city's proposed waste treatment facility to voters by November 12, 1957.

"2. That plans and specifications be submitted for review and approval by June 30, 1958, and that contracts be awarded by January 1, 1959."

September 10, 1957. City officials asked that date for bond election be deferred until June, 1958. Their reasoning was based on the desirability of submitting needed main sewer extensions into annexed area and the city's annexation suit was pending before the Supreme Court with decision not likely before June, 1958.

September 18, 1957. The Division of Health notified St. Joseph that the time schedule formulated at the conference, including November 12, 1957, for a bond election, should be adhered to.

September 26, 1957. The Division of Health was advised by the Mayor of St. Joseph that stock yards industries had made a firm commitment to the city for one million dollars to help defray the cost of the municipal treatment plant. In addition the stock yards interests agreed to pay one-half of the annual maintenance cost of the treatment plant.

January 6, 1958. The Division of Health was notified by the Mayor of St. Joseph that a bond election was set for March 4, 1958, to finance sewage treatment.

February 11, 1958. City officials were advised that the Division of Health would not approve further extensions to the sewer system if the bond election on March 4th was defeated.

On March 4, 1958, bond election to finance sewage treatment and extensions for the St. Joseph sewer system was defeated.

March 5, 1958. The Division of Health advised the city officials that no more sewer extensions would be approved and that the Federal Housing Administration and the Veterans Administration would be notified of our action.

June 11, 1958. Representatives of the Water Pollution Board -- you will notice now we refer from here on to Water Pollution Board because the Board was appointed in March '58 and held their first meeting in April '58, so from there on the Water Pollution Board became the official water pollution agency of the State of Missouri. Representatives of the Water Pollution Board met with St. Joseph city officials to discuss another bond election to finance sewage treatment for St. Joseph. The city agreed to inform the Water Pollution Board of the bond election date.

August 6, 1958. Representatives of the Water Pollution Board, the Public Health Service, the city officials of St. Joseph, and the stock yards interests met to discuss Missouri River pollution at St. Joseph. The Water Pollution Board was to be notified when an agreement between the stock yards industries and the City of St. Joseph had been reached. The city indicated a bond election on or before December 1, 1958.

September 3, 1958. The date for the proposed bond election was requested from the city.

October 30, 1958. In answer to a request from the Mayor of St. Joseph, the Water Pollution Board advised that it made no difference whether the stock yards industries provided their own treatment and the city their own separate treatment or whether the two interests got together and constructed one facility. It was requested that the Water Pollution Board be advised within 30 days which plan would be undertaken and the date a bond election would be held to finance the sewage treatment works.

November 14, 1958. The Mayor of St. Joseph advised the Water Pollution Board that the next bond election could not be held before May 1, 1959.

December 4, 1958. The Water Pollution Board notified the City of St. Joseph that a bond election to provide financing for sewage treatment works on or before May 31, 1959, would be acceptable to the Water Pollution Board.

February 18, 1959. The Water Pollution Board was notified that the stock yards industries were agreeable to proceed with a joint sewage treatment works with the City of St. Joseph at any time. The stock yards industries employed Black and Veatch, consulting engineers, to further evaluate the industrial load.

March 6, 1959. In a letter from the Mayor of St. Joseph to the Water Pollution Board it was stated that no date had been set for the election to finance sewage treatment works. There has been no agreement between the stock yards industries and the city for providing a common treatment plant.

March 10, 1959. Missouri Water Pollution Board requested the Public Health Service to proceed with a hearing in accordance with Public Law 660.

Q. (By Mr. Kurylo.) At this point, Mr. Smith, would you kindly look at Government Exhibit No. 12.

A. Yes, sir.

Q. Is that the letter you just referred to?

A. Yes, sir.

Q. Would you be kind enough to read the last sentence of that letter?

A. The last sentence. "Since it is evident that the City of St. Joseph does not plan to hold a bond election prior to May 31st, it is respectfully requested that a hearing in accordance with Public Law 660 be held relative to the pollution contributed by the City of St. Joseph and the stock yard industries at the earliest possible convenient date."

MR. KURYLO: Mr. Chairman, my recollection is that when that letter was offered into evidence it was offered subject to the objection of counsel for the industries. I respectfully request the Chair to reconsider that ruling.

CHAIRMAN SAMSON: The Chair will reserve the ruling on the question that has been raised at the moment. When we get through with the examination of this witness the Chair will then rule on the question, if that is agreeable with you.

Very well, proceed.

A. That concludes my summation of activities.

Q. (By Mr. Stein.) Mr. Smith, I call your attention to Government Exhibit No. 6, entitled "Lower Missouri River Basin Water Pollution Investigation, a Cooperative State-Federal Report on Water Pollution, October, 1952." Did you distribute this report to the City of St. Joseph and to the principal industries named in the notice of this hearing?

A. Yes, sir.

Q. About when did you do that?

A. Early 1953.

Q. How did you get distribution of that?

A. By mail.

Q. I would like to call your attention now, Mr. Smith, to Government Exhibit No. 7, called "A Comprehensive Program for Control of Water Pollution, Missouri Drainage Basin, a Cooperative State-Federal Report on Water Pollution", dated July, 1953. Did you distribute these to the City of St. Joseph, Missouri, and the principal industries named in the notice of this hearing?

A. Yes, sir.

Q. About when did you do that?

A. The latter part of '53.

Q. How did you distribute those?

A. By mail.

Q. Is it the practice of cities in your state to install treatment facilities for wastes?

A. Yes, sir.

Q. Do many of your cities not have such treatment facilities?

A. Relatively few. In fact, there are only 14 cities with a population of 2,000 located on streams other than the Missouri and Mississippi Rivers which do not provide treatment of their sewage. Now, 4 of these 14 cities that I mentioned have treatment works under construction, 2 have engineering reports approved, and 2 have submitted satisfactory time schedules for abatement of pollution.

Q. What is the situation on the Mississippi River?

A. The Mississippi River? Starting at the upper part of Missouri, northeast corner, the first city is Canton, Missouri, a town of about 2,000 people. They have hired an engineer to prepare an engineering report and cost estimate.

The next downstream city is Hannibal, Missouri, a city of about 25,000. --

CHAIRMAN SAMSON: Mr. Smith, I wonder if you misspoke yourself. Are you referring to the Mississippi River or the Missouri River?

A. I am speaking of the Mississippi. I thought that was the question.

MR. STEIN: Pardon me, Mr. Chairman. We will cover the Missouri next. I think we are indicating the state of municipal sewage treatment in the state. I think Mr. Smith indicated the status of sewage treatment on all rivers other than the Mississippi and the Missouri. Now, he is covering the Mississippi and we will cover the Missouri next and cover the complete state of Missouri water pollution control, municipal treatment.

CHAIRMAN SAMSON: Very well, proceed.

MR. SCHOENLAUB: Your Honor, all of this testimony is irrelevant and has no application to the purposes of this hearing. We are in no way connected with the upper Mississippi nor does the possible stream pollution of cities below the City of St. Joseph have any bearing on the fact findings of the Board at this hearing. That possibly would be a matter for another hearing or possibly a hearing of a different type from this.

CHAIRMAN SAMSON: Subject to that objection, I will overrule the objection.

You may proceed.

Q. (By Mr. Stein.) Will you continue?

A. Hannibal, Missouri, a city of 25,000, provides sewage treatment and has done so since 1940.

Louisiana has sewage treatment works under construction.

Portage Des Sioux has treatment, sewage treatment.

St. Charles will provide treatment works this fall, starting construction this fall. That is, a portion of St. Charles that is tributary to the Mississippi River.

The Metropolitan St. Louis Sewer District treats part of its waste, relatively a small part of its waste. They have hired engineers and are proceeding with their program.

Ste. Genevieve, Missouri, has hired an engineer. He has submitted an engineering report and a bond election is scheduled for August 4, 1959.

Cape Girardeau, Missouri, has submitted an engineering report, and they have made a time schedule for abatement works. Their election is approximately one year hence.

New Madrid and Caruthersville have also submitted time schedules.

Q. What is the situation on the Missouri River?

A. Well, beginning upstream again, I doubt that we need to repeat the condition at St. Joseph, but they do not provide treatment.

Kansas City has an engineering report and cost estimate and according to the conference schedule is to hold a bond election prior to September 1, 1959.

North Kansas City has an engineering report and cost estimate and we have been advised by the city officials recently that a bond election will be held in the not too distant future. We do not have an exact date.

Independence, Missouri, has already voted their bonds. The detailed plans are under preparation and construction, will begin this fall.

Sugar Creek, Missouri, immediately adjacent to Independence, has voted the bonds and they will join with the City of Independence in a joint sewage treatment plant.

The Standard Oil Refinery at Sugar Creek will comply with the schedule set for Kansas City and North Kansas City. They are now in the planning stage, proposed to start construction January 1, 1960.

Lexington, Missouri, has submitted a time schedule or will submit -- pardon me -- will submit their time schedule by October of 1959.

Brunswick, Missouri, has hired an engineer to submit a report.

Boonville has hired an engineer.

Jefferson City has hired an engineer and have submitted an engineering report.

MR. BROWN: May I interrupt at that point?

A. Yes, sir.

MR. BROWN: You omitted Glasgow. What does Glasgow do?

A. Nothing, as far as I know.

St. Charles will start construction this fall on sewage treatment works designed to treat all wastes tributary to the Mississippi and a part of the waste now discharged to the Missouri River.

Liberty, Missouri, which I missed a while ago, has an engineering report and will hold a bond election November 3, 1959.

MR. POOLE: May I ask for a restatement of the Independence situation?

A. A restatement of Independence.

MR. POOLE: For my personal information.

A. They voted the bonds last November. They are now preparing, the engineers are preparing, the detailed plans and specifications, with the idea of getting under contract this fall.

MR. POOLE: Thank you.

Q. (By Mr. Stein.) Mr. Smith, --

A. Getting under construction, I should have said, Mr. Poole.

Q. Mr. Smith, does Independence now treat any of its sewage?

A. Yes, it treats all of the sewage that flows to the Little Blue River.

Q. About how much would you say percentage is that in Independence, Missouri, that they are treating now?

A. I would say that that is about one-third.

MR. STEIN: No further questions.

CHAIRMAN SAMSON: Any cross-examination, gentlemen?

MR. SCHOENLAUB: I just have a couple of questions.

CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Smith, a minute ago you read off a series of orders that had been made to the City of St. Joseph concerning their dumping the raw sewage in the Missouri River, is that not correct?

A. I didn't get your question. A series of what?

MR. SCHOENLAUB: Will you read it back?

(Question read.)

A. We have never issued an order to the City of St. Joseph.

Q. (By Mr. Schoenlaub.) I will put it this way, then. Requests.

A. Yes, that is right.

Q. Will you state now just which of all of those orders or requests to the City of St. Joseph have not been complied with?

A. Which ones have not been complied with?

Q. Yes.

A. Well, they have not yet provided financing. Of course, they have not provided to start construction.

Q. Are those the only two of the requests made to the city that have not been complied with?

A. I think that is essentially correct.

Q. Sir?

A. I think that is essentially correct.

Q. In other words, of that long series of requests covering about five to six years when many, 20, 30, requests were made, all but two have been complied with?

A. Well, they were about the same thing.

Q. Yes, and they were the same thing?

A. That is right.

Q. Actually financing which was rejected by the voters and the construction which could not take place without the consent of the voters?

A. That is right.

Q. So that the officials of the city have complied in every respect with your requests?

A. Oh, I wouldn't say they have.

Q. The city officials?

A. The first time they tried.

Q. The city officials have complied insofar as they are permitted to comply under the law?

A. Sir, we have asked the city to hold another bond election. They failed once. We have asked them to hold another bond election. They haven't complied with that.

Q. Since -- That is within approximately the last year?

A. That is since March 4, 1958, when the bond issue failed.

Q. At the time, at which time there was a change in administration?

A. That is correct.

Q. And persons completely unfamiliar with the situation came for the first time into contact with it?

A. What?

MR. STEIN: Mr. Chairman, I submit that is argumentative. I would not want to characterize anyone in the city government as completely unfamiliar with the situation and I would not think without a foundation that Mr. Smith should be required to do so.

CHAIRMAN SAMSON: Well, subject to your objection, Mr. Stein, if the witness can answer I will permit him to answer.

Q. (By Mr. Schoenlaub.) No, for Mr. Stein's benefit, there was a change of administration?

A. Yes.

Q. At about that time?

A. Yes, sir.

Q. And you immediately requested that the bond issue be resubmitted?

A. We asked them for another date, that is correct.

Q. But outside of that, and the fact that there has been no financing and no construction commenced, have any of the orders or requests for other corrections to the sewer system and the -- well, as an example, further extensions being sanitary instead of combination -- have those orders been complied with?

A. With one exception, and we agreed to that. As I recall, there was a repair or a rerouting of a combination sewer.

Q. But you did approve of that?

A. Yes, that is right.

Q. And all other orders of that nature or requests have been complied with?

A. As far as I know that is right.

Q. You have stated the action that you have taken against the city with these requests and request for a hearing by the State, --

MR. EDELMAN: Mr. Chairman, I object to the constant characterization of these requests as actions against the city and orders. This was not an action against the city. He has already identified them as requests and I think you earlier agreed.

MR. SCHOENLAUB: I think subject to correction that I stated action and requests.

MR. EDELMAN: Against the city.

MR. SCHOENLAUB: Against the city.

MR. STEIN: Requests, as I understand them, are generally not made against anyone.

MR. SCHOENLAUB: You are forgetting part of the statement Mr. Stein.

MR. STEIN: No, I am not.

CHAIRMAN SAMSON: Well, I think it is a play on the words. Counsel may proceed.

MR. SCHOENLAUB: Will you read the question back?

(Question read as follows: "You have stated the action that you have taken against the city with these requests and request for a hearing by the State --")

MR. EDELMAN: I renew my objection to that question, Mr. Chairman.

CHAIRMAN SAMSON: Overruled.

MR. SCHOENLAUB: I will rephrase it.

Q. (By Mr. Schoenlaub.) You have referred to these actions and requests to the city in order to assure treatment of their sewage prior to discharge into the Missouri River. Would you state, please, what action you have taken or requests made to pollution sources above St. Joseph which are polluting the Missouri River to a dangerous state at St. Joseph?

MR. EDELMAN: Mr. Chairman, I must object again. I don't think there has been any evidence that there has been pollution to a dangerous state above St. Joseph, and I request counsel identify the point of the river above St. Joseph. I understand the Missouri is a very long river above St. Joseph.

MR. SCHOENLAUB: There has been very clear and definite testimony by both Mr. Kittrell and Mr. Clark concerning the degree of pollution and contamination and the dangerous state at the St. Joseph water works intake.

CHAIRMAN SAMSON: The objection is overruled. If the witness can answer, I will permit him to answer.

MR. POOLE: May I make an objection? There is considerable competition with you people back there from chair movers over here. They seem to be much closer to us than you.

A. Are you referring to municipalities above St. Joseph in Missouri?

Q. (By Mr. Schoenlaub.) Pollution sources above St. Joseph.

A. In Missouri?

Q. In Missouri.

A. Tarkio, Missouri, has voted bonds for sewage treatment, and, in fact, have sewage treatment works under construction. Rockport, Missouri, has indicated that they are proceeding with engineering studies, cost estimates leading to financing and construction. Maryville, Missouri, has treatment, has had for a number of years. Of course, none of these are directly on the Missouri, they are on tributaries. I don't know of any city above St. Joseph that is right on the Missouri River.

Q. What action, if any, has been made to abate farm pollution and the like on the tributaries of the Missouri and on the Missouri River?

A. We are not charged with that responsibility, sir.

Q. In other words, --

A. And I don't know.

Q. -- any pollution from that source, so far as you are concerned, may continue?

A. That is correct.

MR. EDELMAN: Mr. Chairman, there has been no evidence of pollution from those sources.

MR. SCHOENLAUB: There has been considerable testimony, your Honor, of pollution from farm sources along the tributaries of the Missouri and the tributaries --

CHAIRMAN SAMSON: I believe, gentlemen, if I recall correctly, there has been some testimony in the record here on possibilities from those sources.

MR. EDELMAN: Possibilities, yes, sir.

CHAIRMAN SAMSON: And I believe they were confined primarily to below St. Joseph, however.

But if the witness can answer, I will permit him to answer.

Q. (By Mr. Schoenlaub.) You stated, then, that there has been no action taken so far as your body is empowered to take any action?

A. That is correct.

Q. Is there any organization, to your knowledge, official organization, within the State of Missouri charged with that duty?

A. No, sir, not that I know of.

Q. I didn't hear you.

A. Not that I know of.

Q. In other words, so far as you know, that type of pollution will be allowed to remain in existence?

A. As far as I know.

MR. SCHOENLAUB: I believe that is all.

CHAIRMAN SAMSON: Go ahead, Mr. Brown.

CROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Smith, you mentioned Rockport and Tarkio. Of course, there are several towns up there --

A. That is right.

Q. -- not on the river, Mound City, for instance, and Oregon?

A. That is right.

Q. Do either of them have sewage disposal plants?

A. No. Oregon, I don't believe, even have a sewer system, if my memory is correct.

Q. I didn't know whether they did or not. Does Mound City have any plans at all?

A. I am not sure about that. I believe that Mound City has a treatment plant. I don't think it is adequate.

Q. What does it do, empty into Davis Creek or Squaw Creek.

A. Well, I am not familiar with the creeks up there.

Q. Well, now, there has also been some testimony --

CHAIRMAN SAMSON: We can't hear you up here. We can't hear a word.

MR. BROWN: Can you hear me?

CHAIRMAN SAMSON: Sure, we can hear you, Mr. Brown, but the others.

A. I said that Oregon, Missouri, to my knowledge did not have a sewage collection system. Mound City, Missouri, has a collection system and I believe they have a treatment plant. I do not believe it is adequate. I do not have the records here.

MR. JOHNSON: What is the population of those towns?

A. Oregon, Missouri, is less than a thousand, I believe, and Mound City about the same. That is my memory.

MR. BROWN: Oregon is the county seat of Holt County, of course, and Mound City is probably a better business town in Holt County. I think Mound City is a little larger, Mr. Johnson.

Q. (By Mr. Brown.) There has been something said about the drainage that comes into the Missouri in this particular area. We are talking at this time about the Missouri side of the river, which would be the left bank of the river.

A. Yes.

Q. And the only mention, actually, that has been made was Platte, which comes in some distance south?

A. Yes, sir.

Q. Are you pretty well familiar with the watersheds up here?

A. Fairly well, yes.

Q. Of course the Nishnabotna comes in first, isn't that it, Nishnabotna?

A. I don't know.

Q. You don't know?

A. I don't know.

Q. Well, then Big Tarkio comes in? Now, you can't belittle Big Tarkio, because the Army Engineers have an uncompleted drainage ditch up there big enough to float a battleship, haven't they?

MR. STEIN: What size battleship?

MR. BROWN: Any size you want. I will take you up and show it to you.

Q. (By Mr. Brown.) That is correct, isn't it.

A. I am not familiar with that, Mr. Brown.

Q. Well, you know the trouble they have had on the drainage district in the Big Tarkio district on drainage action?

A. Yes.

Q. It went clear up to the Supreme Court of Missouri?

A. Yes.

Q. And you realize it is a very important ditch?

A. Yes.

Q. And it drains a tremendous area?

A. Right.

Q. And that area is a farming community?

A. That is right.

Q. A lot of cattle and hogs in that area?

A. I would presume so.

Q. And ultimately all of the surface water when it washes that manure off the land, through Big Tarkio and Little Tarkio, it gets down to the Missouri River, doesn't it?

A. I assume so.

Q. You have got the Nodaway coming in between Forbes and Nodaway right at Nodaway?

A. Yes, sir.

Q. And that is a sizeable river?

A. That is right.

Q. It rises clear up in Iowa?

A. I believe that is correct.

Q. You have got --

CHAIRMAN SAMSON: Pardon me, Mr. Brown. Would it be inconvenient for you to conduct your cross-examination from the edge of the table where the Court is?

MR. BROWN: Not at all.

CHAIRMAN SAMSON: If it is inconvenient --

MR. BROWN: Not the slightest.

MR. POOLE: We can't hear him when he looks the other way.

Q. (By Mr. Brown.) Then south of there you have got the Platte River, 102 joins it before it goes down there and the Platte River comes in?

A. Right.

Q. Now, on the Nebraska side you have several streams also that come in there. You have a stream over in Rulo that comes in.

A. I am not too familiar with the Nebraska side.

Q. What I am trying to pinpoint is that from the time the Missouri impinges upon the State of Missouri at its farthest corner until it reaches Kansas City there are thousands of little streams and several large streams that enter the Missouri River?

A. I assume that is correct.

Q. And those all drain farm land?

A. That is correct.

Q. And as you go east, of course, across the state, well, you hit the Grand River, which is used to carry navigation clear up as far north as Utica, I don't know whether you knew that or not.

A. No, I didn't.

Q. You have the Chariton right east of that and north of Glasgow, which drains a number of thousand of square miles, you have the Gasconade, which is declared by the Army Engineers to be navigable at the present time east of Jefferson City where they dock their boats, so again all down the Missouri you have many, many large tributaries coming in.

A. Right.

Q. Now, let's go over on the east side on the Mississippi. You named a number of towns starting at the northeast corner that have prepared sewage disposal plants or in the stage?

A. Correct.

Q. Did you omit any towns on the Mississippi which do dump industrial waste or garbage but have prepared no plans?

A. Not of any size.

Q. Any say larger than a thousand or 15 hundred?

A. Oh, I am quite sure.

Q. You named Louisiana as having plans.

A. Under construction.

Q. Now, if I am not mistaken, just south of Louisiana there is a large Government industrial project which was designed to demonstrate the feasibility of burning lignite or extracting oil from it?

A. Right.

Q. And it is a tremendous industrial operation. Where does it drain its waste?

A. I would assume into the Mississippi River.

Q. That is the only place it can drain, isn't it?

A. That is right.

Q. Has the Government taken any steps to abate that?

A. Mr. Brown, I am not sure that they are contributing any pollution at all at this time. The water pollution law and regulations became effective October 1, '58.

Q. You are talking about the state law?

A. State, that is correct. We have had a number of industries that we have not surveyed and I am not in a position to give you an answer on those.

Q. I am not critical in any sense of the word. I am merely fact finding.

A. That is right.

Q. And I think you would agree that it is a fact that there is a large industrial establishment there --

A. That is correct.

Q. -- that of necessity drains into the Mississippi River?

A. That is correct.

Q. Or one of the pools of the Mississippi?

A. That is right.

Q. Are there any towns south of St. Louis? You named the Cape and Ste. Genevieve.

A. Ste. Genevieve.

Q. Are there any others -- and New Madrid. Are there any other towns down there?

A. Not close.

Q. How about between St. Louis and Kansas City? You named most of the towns around Kansas City and Lexington. You said Glasgow had no plans?

A. That is right.

Q. There are towns on the river which dump sewage in the river, Washington for one?

A. That is right.

Q. Have any of those developed plans?

A. St. Charles -- I mentioned St. Charles.

Q. You mentioned St. Charles.

A. Washington I believe is the only city of any size, that is about five or six thousand. They have not --

Q. So the gentlemen may know, that is where they make the corncob pipes?

A. That is right. They have not developed plans for treatment.

Q. Now, outside of that you say the inland towns, other than those that you have named, with the exception of 14 inland towns 2,000 and better --

A. Yes.

Q. -- excepting 14 have provided treatment plants?

A. That is right.

Q. Of course, there are a number of industries outside of towns which have not but which you have under consideration?

A. There are some that have treatment.

Q. I realize that.

A. Yes.

Q. Now, getting back to the problem here in St. Joseph, are you familiar with the location of the stock yards industries?

A. Yes, sir.

Q. And I take it you are quite familiar with the location of the two sewers or the two outlets which serve the stock yards industries?

A. Yes, sir.

Q. Now, both of those are joint facilities in that they not only serve the yards but they also serve municipal areas?

A. I believe that is correct.

Q. And so it becomes a joint problem to rectify that situation, doesn't it?

A. Yes.

Q. Is it not a fact, as an engineer, you are an engineer and I am not, that logically and economically it would appear that it would be a more satisfactory solution for the city and industry to operate a joint treatment plant?

A. It would appear that way.

Q. And industry has shown a complete willingness, as you have documented --

A. Yes.

Q. -- to share in the cost and maintenance of such a plant?

A. Yes.

Q. And according to the Black and Veatch report which was Exhibit 5 the estimated cost of construction to take care of the stock yards waste was $836,000?

A. The '55 or the early Black and Veatch?

Q. The early report.

A. I think that is approximately correct.

Q. And industry offered one million dollars towards construction and half of the maintenance cost?

A. Correct.

Q. Now, is it not true, in your opinion -- I don't want to lead you and if you don't agree with me, say so -- but isn't it true that industry, from an economic standpoint, is well within its rights in exercising its judgment to do nothing until it can, if possible, work out some agreement with the city?

A. I don't think I want to answer that.

Q. Well, do you think industry should go ahead at larger expense and try and abate its nuisance when it still has to treat two sewers that cross its property?

A. I think that is their problem and they have to decide which way to go.

Q. Well, it is your problem too. It is in your lap as well as ours.

A. Not my problem to decide who does what.

Q. Well, you and Mr. Krebs and Mr. Johnson and a few of the rest of them will have to decide it possibly.

A. I don't think that is their job either.

Q. What would you have industry do that industry has not done?

A. Well, I would have them build their treatment works, if that is what they decide to do. I think they have a perfect right to negotiate with the city or not negotiate. That is up to them.

Q. But if industry builds a treatment works, you still have plenty of pollution from the city.

A. Right.

Q. You have not solved your problem.

A. Not in total, no.

Q. All right. So don't you think industry is better advised to try and save what money it can and to get into an economical arrangement with the city which will better both parties rather than to arbitrarily go ahead?

A. I think that is logical, sir.

MR. BROWN: That is all. Thank you very much.

CHAIRMAN SAMSON: Questions by the Board? Doctor? Mr. Poole? Mr. Johnson? Mr. Kurylo?

I have a few questions.

Q. (By Chairman Samson.) Now, on this Exhibit 12, that is the letter from the State of Missouri. Would you now read the entire contents of that letter?

MR. SCHOENLAUB: If I may, your Honor, I have another question that I would like to ask.

CHAIRMAN SAMSON: You may ask the question. That is all right, Mr. Schoenlaub.

## CROSS-EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Smith, your last statement I think was to the effect that it would be logical for the industries to defer action on their part until something could be worked out either with the city or concerning the city and their sewage because of all these factors, economic factors, and the like, which Mr. Brown referred to plus the fact that there would still be pollution by the city? Is that a correct statement?

A. As I understood the question, it was that was it not logical that the industries consider the most economical way to provide treatment, whether that be by themselves or with the city. My answer to that was yes, certainly it is logical for them to figure out the most economical way, just as it is the city, it is logical for them to figure out the most economical way to do it.

Q. And if they treated their sewage and the city did not, the problem would still be there?

A. Yes, sir.

Q. So that something would have been gained but the goal not gained?

A. That is correct.

Q. Now, if the city and the industries both provided sewage treatment of their sewage prior to discharge into the Missouri River, would not that same reasoning hold true, that the pollution would still exist to a dangerous stage, that the river would still be unusable for general recreational water purpose or water source purposes and swimming because of upstream pollution?

A. What do you mean upstream? Do you mean from St. Joseph?

Q. No, meaning pollution of the river at St. Joseph before the river gets to our sewer outlets. Pollution would still remain and contamination would still be there, the danger would still exist?

A. Well, I think the evidence has shown that there is a problem now at the St. Joseph water intake and until the entire river is cleaned up and provided treatment you won't obtain these objectives.

Q. But these objectives would not be obtained merely by the city and the industries treating their sewage?

A. I don't think so. I think everybody has to do it.

Q. What are the objectives on the Missouri River, to get it down to a swimming level?

A. Let me refer to the report here in which they are outlined in detail, if I may read this.

MR. EDELMAN: That is Government Exhibit No. 7?

A. Government Exhibit No. --

MR. SCHOENLAUB: Is that the exhibit that you were going to furnish us copies of?

MR. STEIN: That is correct, we said we would. We could not find copies.

Q. (By Mr. Schoenlaub.) Go ahead.

CHAIRMAN SAMSON: You may proceed, Mr. Smith.

MR. STEIN: They were just unavailable. I think the record should show that. The distribution of those exhibits has been so wide that there are no longer any copies available.

A. This is Government Exhibit No. 7, reading from Page 9 entitled "Water Quality Objectives."

"Present water uses, increased usability due to improved water quality, and protection of water rights and property values largely determine pollution control measures needed. The goal of water pollution control programs is to preserve water quality to best serve these interests.

"The Engineering Section of the Missouri Basin Health Council, consisting of the Chief Sanitary Engineers of the 10 Basin States, adopted on February 27, 1952, tentative objectives as a guide for water pollution control programs in the Basin. The tentative guide has been employed by the States in the development of their comprehensive program as presented in this report. It is recognized by the States that changes in conditions, particularly as they may affect water uses, and alterations in types of water uses, may require future moderations in any established standards. The tentative objectives as adopted by the States of the Basin are quoted as follows:

"Subject to (a) such higher objectives as may be desired by any State and (b) such other modification as may be deemed necessary, after appropriate investigation, by the State Water Pollution Control Agency concerned, the Engineering Section, Missouri Basin Health Council, recommends the following for consideration by the member States as a tentative guide for water pollution control activities in the Missouri Drainage Basin.

"1. Toxic substances including metallic ions, phenolic compounds, oils, alkalies, and acids should be virtually eliminated from sewage effluents.

"2. Removal of settleable and floating solids to prevent sludge banks, floating materials, and nuisance conditions should be required as the minimum acceptable treatment.

"3. For industrial wastes similar in nature to municipal wastes, treatment should be based on the same premise as recommended for municipalities. For industrial wastes not comparable to municipal wastes, treatment should be provided as necessary to prevent deterioration of water quality for beneficial use in the receiving stream.

"4. Additional treatment over that specified in Item 2 above should be provided as necessary to protect downstream water uses. Quality objectives for certain water uses are:

"(a) For water serving as a source of domestic supply, raw water bacteriological quality should conform to that recommended in 'Manual of Recommended Water Sanitation Practices, 1946, Public Health Bulletin #296,' Pages 11 to 13."

Q. (By Mr. Schoenlaub.) Just one minute, a short question here.

CHAIRMAN SAMSON: Just a minute, Mr. Schoenlaub. Have you finished the answer?

A. No, I have not.

CHAIRMAN SAMSON: I think he should be permitted to finish his answer.

Q. (By Mr. Schoenlaub.) I just wanted to ask about if those water qualities were the same as have been referred to throughout the hearing?

A. Yes, sir. Yes, sir.

CHAIRMAN SAMSON: All right.

A. "(b) For bathing or swimming waters, monthly arithmetical average 'most probable number' of coliform or organisms should not exceed 1,000 per 100 ml. during any month of the recreation season; nor exceed this number in more than 20 percent of the samples examined during any such month; nor exceed 2,400 per 100 ml. on any day. For nonbathing or nonswimming waters, the monthly arithmetical average 'most probable number' of coliform organisms should not exceed 5,000 per 100 ml. in any months of the recreational season, nor should exceed this number in more than 20 percent of the samples examined during any such month;

"(c) For fish and aquatic life a minimum oxygen concentration of five parts per million is desirable in waters otherwise offering suitable fishery habitat, with six parts per million for trout streams.

"(d) For bacteriological quality of irrigation water:

"(1) Sewage used for irrigation of forage crops should be given treatment insuring a consistent reduction in coliform bacteria of not less than 90 percent.

"(2) Sewage used for irrigation of human food crops should be given treatment insuring a consistent reduction (a) in suspended solids of not less than 75 percent, (b) in five day 20 degree centigrade BOD not less than 75 percent and (c) in coliform bacteria of not less than 98 percent, unless discharged into a stream where the volume of dilution water, available during the low flow periods during which irrigation diversions may occur, is at least ten times greater than the anticipated maximum daily volume of sewage, in which case a bacterial reduction of 90 percent may be acceptable.

"Provided, however, that where the time of passage from plant discharge to irrigation diversion is such as to permit the normal death rate of bacteria as evidenced by the die-away curve to provide equivalent bacterial reduction, the requirements of (1) and (2) above may be appropriately modified."

CHAIRMAN SAMSON: With that I believe at the present time I will declare a recess for 15 minutes.

MR. SCHOENLAUB: I only have one more short question.

CHAIRMAN SAMSON: Very well.

Q. (By Mr. Schoenlaub.) Will treatment of the sewage at St. Joseph and the industrial areas accomplish these objectives?

A. I think it will for water supply intake.

Q. It will accomplish these objectives on the Missouri River without anything else?

A. For water quality use downstream.

Q. So that they will be able to swim in the Missouri River?

A. I didn't say that.

Q. That is one of the objectives, increased usability --

A. If it is a swimming stream. If it is a stream used for swimming.

Q. That is one of the charges being made by the Secretary, that the people can't swim in the river. Would they be able to swim in the river after --

MR. STEIN: I will have to object to that. I don't think the Secretary has made any charges. This is not in the nature of a prosecution. This is a fact-finding board. All the Secretary did was recite what the conferees found.

MR. SCHOENLAUB: Well, we will call it whatever Mr. Stein wants.

MR. STEIN: I would suggest you change it and if you want to call it what I want to call it, it is just a recital of what the conferees found at a conference held here under the Act.

CHAIRMAN SAMSON: Possibly we can settle this during recess time.

We will have a 15-minute recess.

(RECESS)

CHAIRMAN SAMSON: The Board will convene for the hearing.

For purposes of the record, I notice there is a mention in the notice of the hearing concerning recreational uses of the river, and in view of that statement in the notice I will overrule your objection, Mr. Stein.

You may proceed, Mr. Schoenlaub.

MR. SCHOENLAUB: Will you read back the last question or part of the last question?

(Question read as follows: "That is one of the charges being made by the Secretary, that the people can't swim in the river. Would they be able to swim in the river after --")

Q. (By Mr. Schoenlaub.) Would they be able to swim in the river and be safe from the hazards referred to in this hearing if the treatment plant recommended by health authorities was installed at St. Joseph to handle the sewage of both the city and the industrial area?

A. My answer to that would be that in some reaches of the river, certainly not immediately below the outfall of the treatment plant.

Q. Would the river at the intakes of the St. Joseph Water Company be safe for those purposes?

A. I can't answer that. I would think it would probably approach it, but whether or not it would actually meet it, I don't know.

Q. Yesterday Mr. Kittrell testified that at that point in the river the contamination level was seven times greater than the level necessary for general recreational use and water supply sources and approximately 36 times greater than would be necessary for swimming. Would that condition at St. Joseph water works intakes be remedied by the City of St. Joseph treating their pollution or their sewage?

A. That would have no effect on -- St. Joe's treatment would have no effect on quality --

Q. That would remain in existence?

A. That is correct, until cities upstream provided treatment.

MR. SCHOENLAUB: That will be all. Thank you.

A. I would like to make one modification, if I could, to those objectives. I found that I overlooked a further modification of objectives on a meeting of the State Sanitary Engineers, Lower Missouri Basin, September 15, 1953. In order to clarify the record I would like to present that modified objective.

MR. SCHOENLAUB: Go ahead.

A. "Summary of Conference, State Sanitary Engineers, Lower Missouri Basin, with the Drainage Basin Engineer Omaha, Nebraska. September 15, 1953.

"The State Sanitary Engineers of Iowa, Kansas, Missouri, Nebraska, and South Dakota, in a meeting on September 15th at Omaha, Nebraska, with the Drainage Basin Engineer, reached agreement with respect to a uniform abatement program for pollution entering the Main Stem of the Missouri River (Randall Dam to the Kansas River, inclusive) as follows:

"1. Each State agreed to pursue, within the framework of its state-wide program, a program of pollution abatement directed to secure treatment of sewage and industrial wastes as outlined in the Lower Missouri Report issued cooperatively by the five States and the Public Health Service. Guidelines for the program as agreed upon by the five State Sanitary Engineers are attached hereto.

"2. The principal objective of treatment is the improvement of raw water quality for domestic use. Removal of settleable and floating solids shall be considered the minimum accepted treatment. In the review of plans and specifications, each state agreed that consideration shall be given to programs of waste salvage, improved housekeeping, fine screening, pretreatment, or other control of plating, packing house and other concentrated industrial wastes as necessary to insure reasonable reduction of toxic materials, oils, acids, alkalies, blood, grease, offal, scraps, paunch manure, and other objectionable matter. Supervision and control of waste reduction programs for industrial wastes entering a municipal system shall be the responsibility of the municipality.

"3. As possible the states will undertake collection of additional basic data aimed to permit maximum feasible evaluation of: (a) existing pollution; (b) reduction in pollution by waste treatment; (c) significance of residual pollution; (d) validity of current bacterial standards relating to raw water; and (e) related factors. Long range programs of coliform MPN analyses will be established at this time as possible at principal water plants, and if feasible, at one location in the upstream portion of the river reach.

"The comprehensive program for control of water pollution in the Missouri Basin, to be adopted by the Surgeon General and now in process of review by state and federal agencies, proposes to adopt programs as developed by the Missouri Basin States, and shown in Sub-Basin reports previously issued. The cooperative report for the Lower Missouri Basin recommends primary treatment for the interstate portion of the Missouri River. The states participating will therefore undertake the program as outlined above, with the understanding that same conforms to the comprehensive program to be adopted by the Surgeon General as reasonable, adequate, giving due consideration to existing and reasonably accepted future uses of water in the Missouri River, and otherwise fully meeting the requirements of the Federal Water Pollution Control Act.

"While complete agreement was not reached, it was the opinion of the majority of State Sanitary Engineers present that continued use of existing combined sewers should be permitted if provision is made to carry up to three times normal flow through the treatment plant, bypassing to the river flow in excess of that amount. Three times normal flow, as the most generally used factor, was thus considered a reasonable objective for main stem systems."

MR. SCHOENLAUB: Thank you.

MR. BROWN: Mr. Smith, I have one or two additional questions.

CROSS-EXAMINATION

BY MR. BROWN:

Q. You mentioned the joint facility to be constructed to be used by Independence and Sugar Creek, which is an industrial area.

A. Yes, sir.

Q. The two of them will use the same treatment plant?

A. Yes, sir.

Q. Do you have any figures as to what it would have cost either community to build separately and what it is going to cost them to build jointly?

A. I think one point of clarification is necessary. You mentioned that Sugar Creek is an industrial community. That is true. However, the City of Sugar Creek has only domestic sewage. Standard Oil, the big refinery, is proposing to build its own treatment plant. So what Sugar Creek is contributing is only domestic sewage.

Q. Do you have any figures as to how much was saved by the two communities building one facility?

A. No, I do not have that information. As far as I know, a detailed study was not made on the cost of each community going its own way versus a combined treatment.

Q. Do you have any figures on this basis? Well, let's take a town close to St. Joseph. Does Chillicothe have a treatment plant?

A. Under construction, nearing completion.

Q. Do you have any cost figures as to the capita cost out there, per capita cost?

A. Yes. The per capita cost at Chillicothe, Missouri, for complete treatment is in excess of $30.00 per capita.

Q. Do you have any estimated figures as to what similar treatment in St. Joseph would cost per capita?

A. Not complete treatment, now, but primary treatment. As I recall, the per capita cost for primary treatment at St. Joseph is in the neighborhood of $12.00 to $15.00 per capita.

Q. Does the per capita cost remain constant, does it increase or does it decrease as the population served goes up?

A. The per capita cost decreases materially as the population served goes up.

Q. Now, one other question. In your department do you set standards of purity of water for use in municipal swimming pools?

A. The Division of Health sets standards for that.

Q. Are you familiar with those figures?

A. I am afraid I am a little rusty on those figures.

Q. Would you know, do they set it on the basis of a coliform count?

A. That is one of the basis.

Q. Do you know what the accepted coliform count for swimming pools is in the State of Missouri?

A. I can't state that with any degree of accuracy. I believe it is in the range of 100, but I am not positive of that.

Q. It is much -- they have a great deal more tolerance than the figures set -- this 1,000 figure set here, do they not?

A. Much less.

Q. They have it just 100 on the same basis per unit, per hundred milliliters or MPN?

A. It is much less that this thousand, yes.

Q. And that is for public pools?

A. Yes, you have a large concentration of people in a small area so the concentration of coliform is naturally much less.

MR. BROWN: That is all. Thank you.

CHAIRMAN SAMSON: I started a few questions on Exhibit 12.

MR. STEIN: Before --

CHAIRMAN SAMSON: Very well.

REDIRECT EXAMINATION

BY MR. STEIN:

Q. I would like to take you back for purposes of clarification of Mr. Schoenlaub's earlier cross-examination. As I understood what you said, you said that after repeated requests from the State, St. Joseph deferred the putting in of adequate sewage treatment. St. Joseph has complied with all those requests except to provide the money and construct the plant?

A. That is correct.

MR. STEIN: Thank you.

Are there still objections by you to Smith's letter.

MR. SCHOENLAUB: No.

MR. STEIN: There are no objections now to that.

CHAIRMAN SAMSON: I didn't understand what the problem was, gentlemen.

MR. BROWN: He asked if there were still objections to Mr. Smith's letter and we both stated we have no objection.

CHAIRMAN SAMSON: Then Exhibit No. 12 will be received without objection. Is that my understanding, gentlemen?

MR. BROWN: That is correct.

MR. SCHOENLAUB: Yes.

CHAIRMAN SAMSON: Thank you very much. It is received in evidence.

(Government Exhibit 12
received in evidence.)

CHAIRMAN SAMSON: Any questions by the Board?

MR. KURYLO: Yes, I have some.

Q. (By Mr. Kurylo.) Mr. Smith, you have information on the cost of the sewage treatment plant proposed here under the bond issue which failed of enactment, total cost?

A. As I recall, the estimated cost was approximately one million seven hundred thousand dollars.

Q. Approximately one million seven hundred thousand dollars total cost. Would that include or exclude the million dollars which information at this hearing indicates industry would make available?

A. The figure I gave you was a total cost of the treatment plant.

Q. How about interceptor sewers and all other costs?

A. Well, that is in addition. That is besides the treatment cost.

Q. What would be the total cost of a sewage treatment facility here, including interceptor sewers and new sewers and such other appurtenances which you deem necessary or appropriate to provide primary treatment here?

A. Well, in the proposal there was interception, pumping and treatment and main extensions into areas not presently served. Now, I can't give you those figures. The total for the whole thing was a little over nine million dollars. That included the main extensions, as I say, in areas not presently served.

Q. A little over nine million dollars, about one million dollars of which would be financed by industry under the proposal made by industry, is that your understanding?

A. Well, let me say this to get -- We are talking about a million seven hundred thousand dollars for the treatment. The industry is not involved in interception and main extensions, so they were paying a little over half of the cost of the treatment plant.

Q. A half of the one million seven hundred thousand dollars?

A. Yes, over half. They were paying a million dollars.

MR. BROWN: If I may, Mr. Kurylo, I can read from the exhibit, it is Exhibit 4. I can give you the exact figures, if you want them.

MR. KURYLO: The total figures?

MR. BROWN: Yes.

MR. KURYLO: Yes.

MR. BROWN: The Black and Veatch 1955 report said three possible plans have been studied. Plan 1, that is the necessary interceptor sewers, mains, forcing mains, and sewage treatment to treat the sanitary sewage originating within the limits of St. Joseph, the cost was $4,585,000.

Plan 2 included all of those facilities plus the necessary structures and facilities needed to grind and dispose of domestic garbage. That estimated cost was $4,970,000.

Plan 3 differed from Plan 2 only in that it provided sufficient capacity in the plant to pump and treat the stock yards sewage and industrial wastes. And that estimated cost was $5,806,000.

So the difference for the cost was the difference between $4,970,000 and $5,806,000. I believe it runs about $836,000.

Now, that Plan No. 3 did not include the costs that would be placed on industry themselves to provide their own facilities in getting their own waste material to the treatment plant. That would be additional cost to each of the industries.

CHAIRMAN SAMSON: What did you refer to, Mr. Brown?

MR. BROWN: Exhibit 4, the first page of Exhibit 4, the 1955 Black and Veatch report.

CHAIRMAN SAMSON: Very well. Thank you.

Q. (By Mr. Kurylo.) Do you know how many sewer tie-ins there are here in the domestic sewage system in St. Joe, Missouri?

A. How many house connections?

Q. How many house connections.

A. I don't know the number of connections. I think the number of people connected we have estimated, based on connections, is something in the vicinity of 62 to 65 thousand. I don't have those figures before me.

Q. Under the Missouri law what means does a community have at its disposal to collect fees for operating a sewer system? Is it a sewer charge, is it a tax on the property, is it a combination of the two?

A. There are two general accepted ways of providing the money to operate a sewage facility.

Q. And build. Operate and build.

A. Operate and build, all right. There are two general accepted methods and a third would be a combination. One is to vote general obligation bonds for the construction. The operation cost would come out of general revenue of the city. The other method is to vote revenue bonds for the construction and maintenance and operation. The revenue law says that maintenance and operation are the first costs to be paid. Then you pay off the bonds for the initial cost. That is usually apportioned to the customer, the individual, based on the amount of water used and is generally a monthly charge. General obligation, of course, is a tax against the property. Now, the other method is a combination of the two, using part general obligation and part revenue. Now, there is one other method, is to vote general obligation bonds and to pay the bonds off by means of a sewer service charge and not impose a tax at all.

Q. Whichever device or whichever combination of devices that might be used, it would be necessary, as I understand, to have an election by the people?

A. Yes, sir, that is correct.

Q. Carrying this point a little further, based on your per capita figures of the population, I understood you to say earlier that the cost of the sewage treatment plant here and all other necessary facilities, your interceptors sewers and those related things, would range from $12.00 to $15.00 per capita.

A. No, I said that was for treatment.

Q. For treatment only?

A. Yes.

Q. It would not be interceptors sewers?

A. No.

Q. Could you give me an estimate of how much the cost of the entire interceptor system and sewage treatment plant would increase the sewer bill per individual or per family in this area on a monthly basis? In other words, are we talking about a bill of $50.00 a month or $5.00 a month or $2.63 a month? How much are they paying now, how much more would the people have to pay under a sewer system such as you suggest might be needed?

A. At the present time the people in St. Joseph, to my knowledge, are not paying a sewer service charge. I would have to do a little computing there. It may be in the report. Mr. Brown has access to it. I do not recall whether the engineering report broke it down as to what the per family cost would be or per user cost.

CHAIRMAN SAMSON: Mr. Ayers, do you have Exhibit 4 there before you? Maybe that will help the witness.

MR. STEIN: If the Chair please, and I don't want to suggest that the Board restrict their questioning in any way, but we plan to put a witness on just after Mr. Smith who has all this information.

MR. KURYLO: I will then defer my question -- withdraw my question and not have any further points to ask this witness.

CHAIRMAN SAMSON: Go ahead, Mr. Johnson.

Q. (By Mr. Johnson.) Jack, would you tell me, this is probably for my own information, in this total cost you are talking about here, does that take into consideration the recent annexation and addition of sewers in that area?

A. Yes, I believe it does. The main extensions to serve those.

Q. That is the part I am talking about.

A. I believe that is correct.

Q. (By Chairman Samson.) Mr. Smith, in connection with the one million dollar proposal by the industry, was it their proposal to furnish that to the construction of the treatment plant alone?

A. Yes.

Q. And is it your understanding that they were to build and pay for the interceptors that were necessary to carry their industrial wastes to the treatment plant?

A. Yes, sir.

Q. At their own obligation?

A. Yes, sir.

Q. And then I believe that the proposal also was that they were to pay one-half cost of the maintenance of the treatment plant, is that right?

A. One-half.

Q. One-half.

A. The annual operating cost.

Q. One-half of the annual operating cost?

A. Yes.

Q. And approximately how much would that amount to, that one-half?

A. I don't have those figures in my mind. I believe the estimated cost of operation is contained in the engineering report.

Q. You are now referring to an exhibit that Mr. Ayers has just produced, that is Exhibit No. 4, is it?

A. Yes, sir.

Q. All right. Now, will you look at that?

MR. BROWN: Page 30, Jack.

A. Thank you. Plan No. 3, which I believe the citizens voted on, the operation and maintenance was $120,000, the billing and collection of accounts was $20,000, for a total of $140,000 billing, collecting, operation and maintenance.

Q. (By Chairman Samson.) Mr. Smith, did that appear to you to be a very reasonable proposition or position taken by industry in this matter?

A. I would think so, yes.

Q. You think it would be a very reasonable position of industry in connection with this proposition?

A. Yes.

Q. Now, let me ask you this in connection with the bond issue that was submitted to a vote of the people on the 4th of March, 1958. Can you generally tell the Board what type of leadership was furnished to the citizens of St. Joe in connection with the proposal that was submitted for their consideration? Was a citizens' committee created?

A. Yes, I am sure it was. And that committee carried on a very good campaign, I would say, informing the citizens of the needs and the cost of the project. I would say they made a reasonably good effort.

Q. Was made to promote the passage of the bond issue?

A. Yes, sir. I think it is evidenced by the fact that they got a majority and they lacked only a few hundred votes of carrying it by the necessary majority.

Q. Then was that ever resubmitted to the citizens and the voters of the City of St. Joseph, Missouri?

A. No, sir, it was not.

Q. And that has been over a year ago, hasn't it?

A. Yes, sir.

Q. Now, in your conferenceswith industry -- I am referring now to the industry out there on the Missouri River south of St. Joseph -- you have carried on negotiations with them all down through the years as you have testified to?

A. Yes, sir.

Q. And have they indicated a willingness to go ahead and carry their share of the responsibility?

A. I would say from the start.

Q. Now, are there any statutory provisions in Missouri involving the bonded indebtedness of a municipality?

A. Yes.

Q. Not getting into the details of that, but can you tell us generally whether or not there is a bonded indebtedness as far as the City of St. Joseph, Missouri, is concerned?

A. I am sure there is some. I don't know just how much that amounts to. On their sewage improvement repair I think that that bond issue was less than a half million dollars and they have paid off some of that, I feel reasonably sure.

MR. POOLE: I have only one question on this.

Q. (By Mr. Poole.) Half of the cost of the maintenance and operation by industry, that included the half of the cost of this billing and collecting?

A. I am not sure about that, whether it did or not. I am sure that maintenance and operation they agreed to pay half of. I am not sure about the billing.

MR. POOLE: That would seem to be the usual way.

CHAIRMAN SAMSON: Any further questions?

MR. BROWN: I can't answer that off-hand. I will find out. I just don't know.

It did not include billing and collection.

Q. (By Mr. Johnson.) I was just going to ask Jack, the total cost was $170,000, I believe you said?

A. $140,000.

Q. $140,000?

A. Yes.

Q. Excuse me. They agreed to pay, would you say, $70,000?

MR. BROWN: No.

A. The testimony just stated $60,000, half of the $120,000.

MR. JOHNSON: I see.

MR. BROWN: The cost of the operation but not the billing and maintenance that they would make to their own customers.

MR. JOHNSON: Yes.

CHAIRMAN SAMSON: Any further questions, gentlemen:

Go ahead, Mr. Schoenlaub.

## RECROSS EXAMINATION

BY MR. SCHOENLAUB:

Q. You stated that in your opinion the arrangement between the city and the industries and the offer by the industries was reasonable on the million dollars and then the half on maintenance. Do you know the percentage of discharge by the city and by the industries into the Missouri River, the volume of sewage and wastes into the river?

A. I don't have those figures in mind. They may be in this supplemental report.

Q. No, I am trying to find what you based your opinion on?

A. Well, I don't recall those figures.

MR. SCHOENLAUB: No more questions.

MR. BROWN: No more questions.

MR. STEIN: No more questions.

CHAIRMAN SAMSON: That is all, Mr. Smith, you may be excused.

(Witness excused.)

MR. STEIN: Mr. Glen Hopkins.

Mr. Hopkins has been previously sworn and has previously identified himself to the Board.

GLEN J. HOPKINS,

resumed the stand and testified further as follows:

## REDIRECT EXAMINATION

BY MR. STEIN:

Q. Mr. Hopkins, did you hear the cooperative treatment works program and objectives, Missouri River quality objectives program, as outlined by Mr. Smith?

A. Yes.

Q. What effect would the putting in of remedial facilities in conformity with that program, if applied to Sioux City -- St. Joseph, rather, have in terms of removal of suspended solids?

A. The removal of suspended solids in a primary treatment plant is markedly influenced by the design of that plant. I think we could say that we can design a plant to effect virtually any degree of removal of suspended solids that was desired. The plan that was proposed, while detailed plans were not submitted, the standards of the five State Health Departments of the Lower Missouri Basin follow those of the upper Mississippi-Great Lakes Board of Engineers which called for a very effective primary removal unit. We have evidence that about 65 percent of suspended solids are customarily removed in that type of treatment plant. That is on municipal wastes. As a general rule, industrial wastes -- the suspended solids of industrial wastes are more readily removed than are the suspended solids of municipal wastes. So it would be my opinion that in excess of 65 percent of the suspended solids would be removed by the treatment program proposed at St. Joseph, particularly if we take into account those suspended solids that would be removed by the industry prior to the discharge of their waste into the municipal system.

Q. What effect will this program have on coliform bacteria if treatment facilities meeting this program are constructed and operated at St. Joseph?

A. The standard textbook figures on removal of coliform bacteria through primary treatment range from 25 to 75. I would refer to the standard textbook Gordon and Fair -- Imhoff and Fair. Again the design of the plant would have a great influence on the removal that would be accomplished. I am confident that a plant designed in accordance with the standards of design previously mentioned would bring about the upper range of reduction in those figures, particularly again if we take into account the reductions in coliform that would be accomplished by the pretreatment or other control of the industrial wastes before they were discharged to the plant.

Q. Will the construction of such facilities by Sioux City and the industries named in this notice for treatment of their wastes at such facilities have any --

CHAIRMAN SAMSON: Did you misstate yourself, Mr. Stein? I think you are talking about Sioux City.

MR. STEIN: St. Joseph.

MR. BROWN: You don't want the Sioux City votes. You want the St. Joe votes.

MR. STEIN: This is a little lower down the river.

Q. (By Mr. Stein.) Will the construction of these facilities have any effect on taste and odor problems at water plants downstream, such as Atchison, Kansas?

A. All of the wastes that have been discussed in testimony preceding this would be markedly reduced by the treatment that I have previously described. The suspended solids contribute to the chlorine demand and the operating problems in that regard, much of the organic materials would be removed by sedimentation and pretreatment of industrial wastes, much of the type of chloroform extractable soluble materials would be removed by taking out the solid matter before it had a chance to disintegrate and dissolve into the Missouri River. I would expect the treatment to substantially reduce taste and odor problems at downstream water plants.

Q. Will all these effects have any effect on the chlorine costs of operators of downstream water plants?

A. As the organic materials in suspended state and in dissolved form and some of the materials to be reduced through the industrial plants before discharge to the sewer system are in dissolved form, the removal of those would reduce the chlorine demand of water reaching the downstream water plants.

Q. Is the cost of chlorine an important segment of water plant operating costs?

A. Keeping in mind chlorine applications as high as 16 milligrams per liter, which would be around 120 pounds per million gallons, assuming a cost of six cents per pound, the chlorine cost on that basis would be about $7.00 per million gallons, which I would say would be a significant part of the cost of maintaining and operating a water plant.

Q. Have Public Health Service studies been made by your Regional Office and under your direction as to the role of algae in the taste and odor problems of the lower Missouri River water plants?

A. For four years, I believe beginning in 1954, we have had biological -- biologists studying that problem in the reach of the river from Yankton, South Dakota, down to and including the lower reaches of the Missouri River. In the upper reaches of the river, where the effects of the reservoirs permit the maintenance of a clear water stream, there have been significant growths of algae that have caused taste and odor problems at Yankton, South Dakota, and to a very minimal extent at Omaha, Nebraska. These studies show conclusively that increases in algae at water plants, St. Joseph and below, are very minimal since the reservoir program was instituted and it has been conclusively shown that algae play a minor role in taste and odor problems of Missouri River water plants below St. Joseph.

Q. Monday Mr. Kurylo requested information as to the number of water services at St. Joseph. Do you now have that information?

A. Yes. That information is contained on Page 7 of the 1955 Black and Veatch report.

Q. Is that Government Exhibit No. 4?

A. Either 4 or 5.

Q. I believe it is 4.

SECRETARY AYERS: That is Exhibit 4.

A. Exhibit 4. I will read the figures for the year ending March 31, 1955.

Residental water connections 17,254, commercial services 4,158, industrial 97, municipal 86, miscellaneous 169, for a total of 21,764 within the city and 8 industrial services in the stock yards area outside the city.

I believe the residential water connections are the best indices of the number of families in St. Joseph that I would have at the moment.

Q. (By Mr. Stein.) Mr. Hopkins, as part of your official duties in carrying out the provisions of the Federal Water Pollution Control Act, particularly Section 4 dealing with research, surveys, studies and investigations, Section 6 dealing with construction grants for municipal sewage treatment works, and Section 8, dealing with abatement of interstate pollution, are you responsible for evaluating the financial ability of municipalities to construct sewage treatment works?

A. Yes.

Q. Are such cost evaluations part of the professional training and duties of a professional engineer?

A. Yes.

Q. Are you a registered professional engineer?

A. Yes, I am registered in the State of Missouri.

Q. Have you examined cost estimates for proposed waste treatment works in St. Joseph, Missouri?

A. I have.

Q. Did you analyze the financial aspects of the bond proposal submitted to the voters of St. Joseph, Missouri, on March 4, 1958?

A. Yes.

Q. Would you describe that?

A. May I clarify the question?

Q. Yes.

A. Did you ask of the engineering proposals as contained in Exhibit 4 or the proposal put before the city on March 4, 1958?

Q. I believe the engineering proposal placed in Exhibit 4 was covered for us very ably by Mr. Brown.

A. I have no --

Q. Do you feel you want to expand on that or clarify that?

A. I have no disagreement with Mr. Brown's figures as they related to the proposal for a municipal treatment plant in the city or a proposal to provide a plant to serve also the industries outside the city.

Q. Go ahead.

A. The March 4, 1958, bond proposal was in a total amount of $9,150,000. Of this amount $5,950,000 was for the construction of interceptor sewers, pumping stations, and sewage treatment plant. The figure of $5,950,000 included the $1,000,000 to be reimbursed to the city by industry. The bond proposal included an item of $2,300,000 for construction of main sewer extensions within the then constituted limits of the city to bring sewer service to approximately 20 percent of the homes in St. Joseph not now served by sewers. That figure of $2,300,000 was not a part of costs attributable to sewage treatment.

The bond issue also provided an item of $900,000 to extend main sewers to the annexed part of the city when and if annexation was fully complete. That item of $900,000 is not properly a part of the cost of sewage treatment. It is new sewers.

The total figure for pumping stations, interceptor sewers, and sewage treatment was $5,950,000 of which industry would contribute $1,000,000.

Q. That was in 1958?

MR. BROWN: '55.

MR. STEIN: Pardon me?

MR. BROWN: '55.

MR. STEIN: No, the election.

MR. BROWN: The election was in 1958.

Q. (By Mr. Stein.) Will you tell us the effect of current construction costs on this analysis you have made?

A. The construction cost index has naturally increased since the 1955 report and provision for that was included in the 1958 bond proposal, which will explain the differences in cost figures as cited for the bond proposal and those given in the Black and Veatch report of 1955. If we allow a five percent increase in cost for the $4,950,000, which would be the city's part of the treatment plant proposed in the 1958 bond issue, the figure would be raised to approximately five and three-tenths million dollars. If we allow the authentically reported increase in construction costs since 1955 to the figure of $4,585,000 set out in the 1955 Black and Veatch report for the city treatment plant, that would bring that figure to five and three-tenths million dollars, which I would estimate as the current cost of that treatment facility. This figure, five and three-tenths million dollars, does not include the allowance for industrial wastes and does not include the cost to be borne by industry. If industry is to be served into the treatment plant, and using the same basis of cost allocation, a million dollar figure -- a figure of approximately a million dollars should be added to the five and three-tenths million dollars to make it a current cost figure on that basis.

Q. Can you translate these current construction costs into per capita costs for the people of St. Joseph, Missouri? What would be the per capita cost?

A. Well, if we use the 1950 census population of St. Joseph as 78,588 and the current estimated cost figure five and three-tenths million dollars, that would give a per capita cost of $67.44 for -- that would cover interceptor sewers, pumping stations and sewage treatment. That per capita cost makes no allowance for the charges that would be made to industrial and commercial establishments inside the city, which would somewhat reduce the private citizens' per capita cost. It would be somewhat less than $67.44.

Q. Have you investigated per capita costs, sewage treatment plant costs, for municipalities in other Kansas and Missouri cities?

A. Yes, I have. Particularly under the construction grants program of Public Law 660 my office has detailed construction cost data for the ten communities in Missouri and the 29 communities in Kansas where conventional type sewage treatment plants of the type generally visualized for St. Joseph have been built in the last two years.

Q. Have you summarized your compilation in the form of a table, Mr. Hopkins?

A. Yes, I have copies here.

MR. STEIN: I ask that this be marked as Government Exhibit No. 35 for purposes of identification.

(Government Exhibit No. 35
marked for identification.)

CHAIRMAN SAMSON: Would you produce a copy for counsel, please?

MR. STEIN: I offer this as Government Exhibit No. 35 in evidence.

MR. SCHOENLAUB: No objection.

MR. BROWN: I have no objection.

CHAIRMAN SAMSON: There being no objection, the exhibit will be received.

(Government Exhibit No. 35
received in evidence.)

Q. (By Mr. Stein.) How will the per capita cost for municipal sewage treatment in St. Joseph, Missouri, compare with other municipal sewage treatment plants built and planned for this area?

A. In arriving at that figure I have tabulated the actual cost of projects in the two states. I have used only those projects where new sewage treatment plants were built. In other words, I excluded communities that previously had sewage treatment plants and were merely enlarging them to meet the increased growth or loading requirements. The costs included only interceptor sewers, pumping stations, and treatment. In ten communities in Missouri with populations varying from a little over 1,000 to above 65,000 the average per capita cost was $70.75. The median per capita cost of the projects in Missouri was $87.13. The average per capita cost and the median per capita cost are both somewhat above the per capita cost mentioned for St. Joseph, $67.44.

In the 25 communities in Kansas on which I have developed similar information -- and again this includes only interceptor sewers, pumping station and sewage treatment -- the population of the communities varied from less than 400 to over 30,000. The average per capita cost for these 25 communities was $67.71, very close to that for St. Joseph. However, the median per capita cost was $98.15. That is substantially above the St. Joseph cost.

I studied one additional project in Kansas for which cost data was available but which has not yet entered into construction, that is Atchison, Kansas, where the per capita cost will be $94.50. I also compared this to the estimated per capita cost for comparable facilities at Sioux City, where the costs per capita will be $73.00 as compared to $67.44 for St. Joseph.

Q. Will you express the municipal sewage treatment cost figures for St. Joseph, Missouri, in terms of charges per family in that city?

A. Allowing for the costs to amortize the bond issue over the life of the proposal, using maintenance and operation costs as outlined in the Black and Veatch report and using the current interest rates for revenue bonds, it is my calculation that to build, maintain and operate the plant under my current cost estimate would be approximately $1.50 per family per month.

Q. Will you tell us St. Joseph, Missouri's bonded indebtedness for water?

A. I believe St. Joseph has no bonded indebtedness for water.

Q. Will you tell us St. Joseph's bonded indebtedness for sewers?

A. My latest information indicates that that is $493,000. That is of 1958.

Q. Will you tell us St. Joseph's total bonded indebtedness?

A. Again as of 1958, $4,441,500.

Q. Will you give us the assessed valuation of property within St. Joseph, Missouri?

A. The 1957 assessed valuation for all property in St. Joseph is $81,970,530.

Q. Will the sewage treatment facilities you have described be within the bonding capacity of the City of St. Joseph, Missouri?

A. The laws of Missouri provide that cities of the class of St. Joseph can vote bonds up to 20 percent of their assessed valuation. That is general obligation bonds. In addition they may vote revenue bonds without limit, the limit being established only by the salability of those bonds. If general obligation bonds were used the bond issue required for interceptor sewers, lift stations, and the treatment plant, plus the sewer bonds now outstanding, would represent less than seven percent of the assessed valuation, which is well within the legal bonding limitations of Missouri law and many, many cities in Missouri have bonded themselves to a much heavier percentage of their assessed valuation to provide sewage treatment facilities. In addition, the city has complete recourse to a program of revenue bond financing which would not be limited in any way by state law and which was the proposed basis of financing the sewage treatment program as constituted in the March 1958 bond proposal. Revenue bonds for sewage treatment is the most popular method of financing treatment works in Missouri in recent years.

Q. Mr. Hopkins, to switch kind of abrupty, I would like to call your attention to Section 81.9 of the regulations governing the hearings of this type relating to recommendations of the Surgeon General. Have you been authorized by the Surgeon General to make such recommendations?

A. I have.

Q. Do you have those recommendations with you?

A. I do.

Q. May I have copies of them?

MR. SCHOENLAUB: Mr. Chairman, would it be possible to recess at this time until after lunch? I have a talk that I have to make at a meeting that starts in about four minutes.

CHAIRMAN SAMSON: Very well. We will accommodate you.

MR. SCHOENLAUB: In an entirely different matter.

CHAIRMAN SAMSON: Would it be possible to reconvene again about 1:15?

MR. SCHOENLAUB: That is fine.

CHAIRMAN SAMSON: Is that agreeable with counsel?

MR. STEIN: Yes.

MR. SCHOENLAUB: Thank you.

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WHEREUPON, the hearing stood at noon recess until the hour of 1:15 o'clock in the afternoon, at which time the following further proceedings were had and entered of record, to-wit:

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AFTERNOON SESSION, THURSDAY, JULY 30, 1959.

CHAIRMAN SAMSON: The hearing will reconvene for the afternoon session.

MR. STEIN: Mr. Chairman, I believe we had talked about a time schedule prepared by the representative of the Surgeon General. I want to indicate at this time that this time schedule is being submitted now based on the presentation of the Government's portion of the case and the situation as we see it. It is put forth at this time so that counsel for the industries and the city can direct their attention to this time schedule in the development of their case, to give them a full opportunity to analyze it and direct either cross-examination of Mr. Hopkins or evidence or argument to the Board concerning it. We will say that Mr. Hopkins and the representatives at this table are authorized to make recommendations for any modifications or adjustments in such time schedule if the arguments or the evidence or testimony produced by the city or by industries should so indicate.

GLEN J. HOPKINS,

resumed the stand and testified further as follows:

REDIRECT EXAMINATION
(Continued)

BY MR. STEIN:

Q. With that, Mr. Hopkins, will you read this time schedule to the Board?

A. In accordance with the 42 Code of Federal Regulations 81.9, as the representative at this hearing of the Surgeon General of the Public Health Service I have been authorized to recommend that:

1. The City of St. Joseph, Missouri, and the firms named in the notice of this hearing construct and place in operation proper, adequate and effective municipal and industrial sewage and waste collection treatment and disposal facilities as necessary to abate pollution of the interstate waters of the Missouri River in accordance with the schedule hereinafter set forth.

2. On or before September 1, 1959, each such firm desiring to be served through the municipal system shall advise the city of the volume and character of sewage and industrial and other wastes it proposes to discharge to the municipal system.

3. On or before November 15, 1959, the City of St. Joseph shall complete the financing of necessary remedial works, including a bond election and other actions as required by state law.

4. On or before December 1, 1959, the City of St. Joseph shall in writing instruct its engineer to proceed with final plans and specifications for proper, adequate and effective treatment facilities for the sewage and industrial wastes and other wastes to be discharged

through the municipal system. If such action is not taken by the city or if such instruction does not provide for service to industries located outside the city, such industries shall initiate detailed planning for their own remedial facilities not later than January 1, 1960.

5. On or before July 1, 1960, final plans and specifications for such remedial facilities shall be completed and submitted to the Missouri Water Pollution Board for review and approval.

6. On or before November 1, 1960, such remedial works shall be placed under contract for construction.

7. On or before November 1, 1962, construction of all such remedial facilities shall be completed and such facilities shall be in operation.

8. Within 15 days of such date established in this schedule, the City of St. Joseph and each firm engaged in any industry involved in this hearing shall advise the Missouri Water Pollution Board as to progress toward compliance with each step of the schedule applicable to them.

Q. We have no further questions, Mr. Hopkins, except I would like to know, Mr. Hopkins, on 3, should that read "shall complete the arrangements for financing"?

A. I would accept that.

MR. BROWN: Which is that?

MR. STEIN: On 3 instead of "complete the financing" put "complete the arrangements for financing".

A. That would be acceptable. "Complete arrangements for financing."

CHAIRMAN SAMSON: Does that complete your questioning, Mr. Stein?

MR. STEIN: Yes, sir.

CHAIRMAN SAMSON: Mr. Brown?

MR. BROWN: Yes, your Honor, I have some questions.

## RECROSS EXAMINATION

BY MR. BROWN:

Q. Mr. Hopkins, this set of recommendations, of course, requires a lot of consideration and time and study I haven't had time to give it, but let me ask you a few questions concerning it. I think you recognize that if an order something similar to this is handed down by the Board that it is only logical that the city should take steps first with the cooperation of industries, industries should notify them as quickly as possible and then they should take their steps and then industry should cooperate with them to the best of their ability to try and work this out. In other words, you say industry -- I am taking Item 2 -- "Industry shall on or before September 1". Now, I agree that before the city can act industry must give them some idea of what they will have to take from industry if it is to be one plant. But let me ask you this. At the present time, of course, our evidence is not in. We will show, taking just one industry as an example, that the Seitz Packing Company -- and I am quoting from what their statement and testimony will be -- "is conducting experiments on methods for the removal of the paunch content of the cattle slaughtered so that this material will not go into the sewage system."

"The company has requested estimates for the construction of a clear water sewer in order to reduce the volume of water that would need to be treated."

Now, that company has requested estimates, but realizing the complexity of this situation, don't you think that between, say, the middle of August, when an order will be handed down if this recommendation is adopted, it puts industry in a rather awkward situation and an almost impossible situation?

A. I don't believe so, Mr. Brown. I would like to give you my reasons why. I believe that industry has been cognizant of this problem for several years, has been studying it, they have information from other plants in the packing house industry as to what the logical approaches to reducing these wastes are, and what the results of those can be. I do not believe that at St. Joseph this constitutes an unreasonable burden on the industries.

Q. You are aware of the fact that most construction firms at the present time are booked solid for the next eight to twelve months, are you not?

A. I believe that diligent effort will find a firm that is willing to get this under way.

Q. Well, would you agree with me that if you can find such a firm it probably is not the desirable firm? If it doesn't have the business on its books now it probably isn't the firm you want?

A. I believe the firm that has handled the waste matters for industries in St. Joseph could meet this schedule itself.

Q. You think Black and Veatch could meet the schedule --

A. That is who I was speaking of.

Q. -- by the first of September?

A. Yes.

Q. Is Mr. Brown with Black and Veatch here, do you know?

A. I do not know.

Q. Have you talked with Mr. Brown?

A. I have not talked with Mr. Brown.

Q. If Mr. Brown will tell you that knowing of the situation it would be impossible to do it, would you accept his statement as substantial evidence of the impossibility of the situation?

A. I would have to include in that that I would have to have opportunity to evaluate the reasons why he said it could not be done.

Q. You would agree, would you not, that 45 days is a rather short time for large industries to make plans for substantial changes of this character?

A. Mr. Brown, it is my opinion that basically this was determined before a cost allocation between the city and the industry was agreed upon prior to the last bond election. I don't see how the costs could have been allocated without that information being at hand because that proposal also required the reduction of industrial wastes before discharge to the city system.

Q. Let's go to your next paragraph. You have said that the recommendation is that "On or before November 15 the City of St. Joseph shall arrange" -- I believe you substituted "arrange"?

MR. EDELMAN: "Complete the arrangements."

MR. STEIN: "Complete the arrangements."

Q. (By Mr. Brown.) -- "complete the arrangements, including a bond election"?

A. Yes, sir.

Q. If an award is handed down -- I assume it takes 10 to 15 days before an award is handed down, does it not?

A. I would say that would be a reasonable estimate.

Q. So if it is handed down in that time it would be about the middle of August and you are requesting the city to educate the population, change public sentiment, complete their arrangements and hold a bond election in the short time of three months?

A. The time allowed that is provided in that step is well in advance of that required for any of the necessary steps to permit the holding of such a bond election, and I believe that no concerted educational plan, as you refer to it, would require longer than that.

Q. Are you familiar with the statutes governing bond elections for a city of this class?

A. I believe so, generally.

Q. To begin with, it would take at least 30 days to pass the ordinance, wouldn't it?

A. The laws specify certain actions that must be taken prior to the adoption of the ordinance. I do not believe -- I will not say positively -- I do not believe that they specify that 30 days must be required for that.

Q. You are further aware -- I believe it is 30 days. But you are further aware of the fact, are you not, that no ordinance could be passed until the costs could be accurately ascertained?

A. I believe the costs are rather accurately ascertained, much more accurately than have sufficed for numerous bond elections in Missouri, and that information is now available.

Q. I am advised that Mr. Brown of Black and Veatch will testify that it will take at least six months to get the necessary data before they can even start on your plans.

A. Is that concerned with Item No. 2?

Q. That is concerned with the -- in fact it affects everything, because if it takes Black and Veatch six months to get the necessary data, it is going to take considerably more time to formulate the plans, draw up the plans, and then the plans must be given to the city so that they can pass an ordinance setting out the cost, and yet you want it all done within three months.

A. All of that work that you outlined, Mr. Brown, is not customarily done ahead of the election of a bond issue; for example, the last bond issue that you had here. Detailed plans and specifications customarily are not even started until after the bond issue is held and successfully passed.

Q. The proof of the pudding is that the last bond issue failed because there was not sufficient time, in my opinion, to educate the public and your testimony of the Government here is that the city didn't drag its feet, it actively tried to pass the bond issue. Now, do you think it is fair to a municipality which once tried, to give even a shorter time to do it the next time with a complete new set of data?

A. I believe the time is entirely reasonable and adequate.

Q. You think it can be done, despite the fact that Mr. Brown says it can not be, who is the engineer?

A. Mr. Brown has not told me that it will take six months to do the work that is required for steps 2 and 3.

Q. Have you had experience with the passage of bond issues in other cities on such questions as this kind?

A. Yes.

Q. In Missouri?

A. Yes.

Q. What cities, for instance?

A. Numerous cities in Missouri.

Q. Well, let's just pick any one you want to pick as a guinea pig.

A. Higginsville, Marshall, Warrensburg.

Q. Higginsville? That, of course, is not on an interstate stream; that is an inland city. Now, how long did they start working before they actually passed their bonds?

A. Sugar Creek first announced its --

Q. No, we are taking Higginsville.

A. I have a specific example. You said it wasn't on the Missouri River. I want to give you one that is specifically on the Missouri River. -- first announced its election to the people I would say less than three weeks before the bond issue and it passed by a majority of eleven to one.

Q. But how long before that did they start getting their plans?

A. Their plans -- they do not yet have their plans.

Q. How long before that was it agitated in the paper down there?

A. The paper for the area is The Kansas City Star and I did not ever notice it being mentioned there at all.

Q. You mean that out of a clear sky, three weeks before a bond election, the city suddenly announced "We need a sewage disposal plant, we don't know what it is going to cost," and they passed the bond issue in three weeks? Is that what you want the Board to understand?

A. The Kansas City Star, which serves the Kansas City metropolitan area, of which Sugar Creek is a part, has been replete with articles for several years of the existence of the sewage treatment problem, so that, like at St. Joseph, the people at Sugar Creek were generally aware of the problem and the need for corrective measures.

Q. Well, then, it wasn't a matter of three weeks, it was a much longer time? The matter had been discussed and sentiment had been formulated?

A. We were talking about the bond issue proposal.

Q. Well, but the passage of the bond issue depends on whether the sentiment was crystallized to the point where it will accept it?

A. Those activities have been apparent at Sugar Creek to a much less degree than has already been done in St. Joseph.

Q. You see, Mr. Hopkins, you are dealing with Missourians, your "Show Mes", and some people say mules, and they want to know the facts. Now, you have suddenly produced on your side of the case a certain amount of evidence, which is quite substantial. I would be the last man in the world to deny it. Do you think that the people of St.Joseph assimilate this evidence and understand this when they voted it down a short time ago, that they can be re-oriented and put on a new hat and get all this done in that -- you have gotto take 30 days out before you can even get the ordinance passed.

A. I think the -- Well, the educational campaign that you mentioned need not await the actual passage of the ordinance. I think the people of St. Joe would be much more capable of making a concerted assimilation digestion of the facts of this case in six weeks than if they scattered it out as a piecemeal job over one or two years.

Q. You don't think you can catch more flies with honey than you can with vinegar?

A. I think the supply of honey has probably been exhausted in this situation.

Q. Mr. Hopkins, you realize you face an alternative. Suppose you get the people of this community -- I am speaking here not as a representative of industry, but as a citizen of St. Joseph. Suppose you antagonize the people of this community. They have a lawsuit pending in Federal Court. Now, your purpose is to achieve the elimination of pollution, isn't it?

A. That is the objective of my program, yes.

Q. All right. You are not interested in litigation?

A. No.

Q. You are not interested in delays?

A. No. Are you asking --

Q. If you attempt to force a population to do the impossible, the only alternative they have is to go to the Federal Court and not only start their case, as it has been started, but continue it in the Supreme Court of the United States. Now, that means a much longer delay than I have suggested here. If you come in here with threats, as much as I personally believe that pollution is ultimately going to be stopped, I will be the first person to say that you can't do it. Now, if you come in here in a conciliatory manner and say to these people in this community, "We want to work with you; we think this should be done; we will be reasonable if you will", I will be the first person to go out and try and get it done, but so far as I am concerned I think it is absolutely impossible to get it done in the time you have recommended.

A. This is a recommendation that is being made to the hearing board. The Board, for good and just reason and cause -- it would be adjusted before it was presented to the Board. The Board if it has reason to believe that it is not proper is free to adjust these recommendations before they are transmitted to the Secretary. I have had nothing to indicate that the City of St. Joseph has in mind any constructive action towards a solution of this problem other than an action filed in court, as you mentioned, in advance of this hearing. So I don't believe that there has been any cause yet shown as to why delay on the part of the city should be granted.

Q. You have not given us the name -- I asked for the name of a common contractor. You suggested Black and Veatch, and, as I told you, I was informed that they can't do it. Do you know of another common contractor that could do it in the time you suggested?

A. I would answer your question in this regard, that I was assured by a senior partner of the firm of Black and Veatch that six months after notice to proceed would be a reasonable time to complete the plans and specifications, provided that the data reasonably expected to be available would be then available, which, in my opinion, it is.

MR. BROWN: That is all. Thank you.

CHAIRMAN SAMSON: Mr. Schoenlaub, please?

MR. SCHOENLAUB: No questions.

CHAIRMAN SAMSON: Questions by the Board?

DR. MARTIN: I have a hypothetical question that I would like to ask Mr. Hopkins to clear up some of the uncertainties about the effectiveness of this sewage treatment plant.

Q. (By Dr. Martin.) Mr. Hopkins, will you assume that the waters of the Missouri River that come to St. Joseph have been purified to the extent that they meet the objectives of the conference committee for water quality of public water supply, this is below 5,000 organisms per hundred ml; and will you assume that the City of St. Joseph builds this high efficiency primary treatment plant which you have outlined for us or which has been outlined for us earlier; and will you assume that this treatment plant is operated skillfully and well. Do you have data to indicate or do you have a considered opinion that would indicate that the waters of the Missouri River reaching the City of Atchison, Kansas, would then also be within the 5,000 coliform limit for public water supply at their water intake?

A. In your question am I correct that one of the bases was assuming that abatement of upstream pollution had already brought this about at St. Joseph water works intake?

Q. Yes.

A. It is my opinion that the reduction in actual bacterial pollution through the plant through the corrective measures of the industry preceding discharge to the municipal plant, plus the accompanying reduction in nutrient material, would lower the bacteriological concentrations at Atchison so that it would meet or approach meeting the objectives that have been stated.

DR. MARTIN: Thank you. I have no further questions.

CHAIRMAN SAMSON: Any other questions by other members of the Board?

Go ahead, Mr. Poole.

Q. (By Mr. Poole.) I want to get myself absolutely straight on this Missouri law regarding the issuance of bonds. Am I correct that St. Joe, for example, can't issue bonds to do this job without a favorable referendum of voters?

A. The laws of Missouri require a referendum of the voters for revenue bonds that requires a four-sevenths majority; for general obligation bonds it requires not less than a two-thirds majority.

Q. Well, then, in other words, irrespective of the feeling of any of us, one of the things that we must take into consideration is that the men on the street out here have to be brought around to a favorable vote before the city can issue bonds?

A. I think that has largely been accomplished, because at the last election if only 385 persons of those voting had voted "yes" instead of "no" the four-sevenths majority would have been reached.

Q. Would you mind, since you are going into your notes, giving me those figures on the last election, total votes?

A. I have them here. The March 4, 1958, election, 7,826 voted "yes", 7,218 voted "no".

Q. Do you have any approximate figure of the total number of eligible voters in the community?

A. I would not want to make this as a positive statement, it is an impression, that at the time of the bond issue it was reported that slightly more than half of the eligible voters voted. That is an impression and not a statement of fact. That would make it somewhere about 15,000 voted, that would indicate that the general range of voters would be in the neighborhood of 25,000 to 30,000.

Q. I am still a little fuzzy on this Point 2, the material that is asked for in Point 2, that is, namely, a report by the industries on volume and characteristics of the wastes that they would like to discharge to the city. That is all contained in this 1959 report of Black and Veatch, which is one of the exhibits, 5 I believe it is, is that correct?

A. The 1959 -- I mean 1955 report gave an estimate of wastes then discharged. Since that time there has been considerable reduction in the industrial wastes discharged. The 1959 report gave an accurate representation as to the volume, the strength, the pounds of suspended solids that were being discharged as of that date. There are some further reductions in industrial wastes that are planned and I had understood programmed, I am sure that the planning was complete prior to the -- that is, as to the reductions, not the detailed planning -- was complete before the 1958 bond issue. The intent of Point No. 2 is to provide the city with the information that it needs to provide -- to enable its consulting engineers to proceed with plans and specifications.

Q. Well, now, --

A. I would include as to the data, the volume, the anticipated BOD, and the anticipated suspended solids.

Q. I will get a little more specific or give you what is back of my question. I heard reference here today, either by you or one of the earlier witnesses, to certain pretreatment that was contemplated by some of the industries. What I am trying to arrive at is are all of those issues settled or were they settled in this 1959 report so that it is only a matter of going back to a bunch of files in order to be able to say to the city that we want to discharge X gallons per day of X type of waste?

A. In my opinion, Mr. Poole, it is not something that would require detailed plant studies, detailed engineering considerations in addition to those already taken.

MR. POOLE: That is all. Thank you.

CHAIRMAN SAMSON: Any other questions by any other members of the Board.

MR. BROWN: Yes, I have. Pardon me.

CHAIRMAN SAMSON: Would you let the Board ask their questions here at the moment, please?

MR. BROWN: Yes, certainly.

CHAIRMAN SAMSON: Thank you.

Q. (By Mr. Kurylo.) You indicated on direct examination that the last bond issue, which was defeated by a close vote, contained certain items of cost which you did not regard as essential for attaining the objectives of pollution abatement here.

A. Yes, sir.

Q. Would you mind stating the specification and the amounts of money involved again for the record?

A. $2,300,000 for construction of main sewer extensions, within the then existing limits of the city. $900,000 for extensions of main sewers to the annexed areas when and if these areas were annexed.

Q. That represents a total of $3,200,000, which in your opinion could be deferred and is not essential for --

A. It is not a part of the pollution abatement program.

Q. With respect to the major item of $2,300,000 extension of main sewers into areas within the present boundaries of the city, would that have to be done at a later date?

A. It would be very desirable for that to be done. I am sure that it would improve sewer service to many homes and I would certainly class this as a desirable civic improvement. It did, I think complicate the bond issue, because it was proposed in some quarters that the city had already paid for the existing sewers on a benefit basis and now sewer service charges would be asked to finance sewers to new areas.

Q. In other words, insofar as the objective you are striving to attain here, a bond issue could be in what amount of money to achieve those purposes?

A. To achieve the construction of the interceptor sewers, the pumping stations and the sewage treatment plant, in accordance with my previous testimony, would require a bond issue of five and three-tenths million dollars. If industry was to be served by that plant, the costs of the industrial service could be added to the bond issue and paid off on a long-term or could be financed otherwise. I only intend to point out that five and three-tenths million dollars expenditure required by the city to abate its pollution could be done on that basis.

Q. And you cited a cost of $1.50 per family being served per month as your estimate of the amount of money that would be needed to amortize the obligation and maintain and operate the plant after it is built?

A. Yes, I did give that figure.

Q. If the city should, as it did, initiate another election for a bond issue covering the total amount, that is these other things, as it did earlier, the total cost would be less than double per family, would it not? It would be less than $3.00 per month per family?

A. I think we have a misunderstanding of your question or my previous answer, one or the other, Mr. Kurylo. There is no sewer service charge levied now in St. Joseph. If they were instituted at the rate of $1.50 per month, they would finance the five and three-tenths million dollar program that I outlined.

Q. But if, on the other hand, the city decided, for whatever reason it might, to include in its bond issue these main sewer extensions and the main sewers into parts of the city which it might annex, the total cost would be less than $3.00 per month per family, is that correct?

A. Substantially less than that. They would bring in additional families. Only those connected to sewers would pay the dollar and a half per month that I mentioned earlier.

Q. Only those presently connected, is that correct?

A. Yes. If the 20 percent of the family -- of the city not now sewered was also given sewers, that is of the old city, and if the newly annexed area were given sewers, and if the commercial establishments in the city were charged their prorated part, the $1.50 per month would finance the vast majority of the total program that was included in the original bond issue at this time.

MR. KURYLO: I have no further questions.

CHAIRMAN SAMSON: Mr. Brown.

## RECROSS EXAMINATION

BY MR. BROWN:

Q. Mr. Hopkins, when you translated the '55 costs into present costs, did you first add an increase to translate them into '58 costs and then add five percent on to that?

A. I did it two ways. I added an increment since March of '58 to cover the figure used in the '58 bond election. Then I compared that with the construction cost rise since the 1955 report and arrived at the same figure. So I made the adjustment both ways.

Q. The adjustment on a percentage raise over '55 is about 15 percent, isn't it?

A. Slightly less than 15 percent for this type of work.

Q. Now, you were talking about the possibility of passing this and you were asked the electoral vote in St. Joseph. You are aware, are you not, that there has been an annexation proceeding in St. Joseph and as of January 1st of this year there are some 10,000 new residents of the city who did not vote at the last election?

A. Yes.

Q. That represents a sizeable portion of the electorate who will have to be educated, doesn't it?

A. Yes.

Q. You are also aware, are you not --

A. Wait a minute. I interpreted your question as a sizeable portion of the population and then I gave my answer and you added "who had to be educated". I think that they profited by and participated in much of the educational campaign that was carried on for the last bond issue.

Q. You are further aware, are you not, that the people who were annexed, at least a number of them, fought it so virorously that they fought it clear up to the Supreme Court of the State of Missouri?

A. Yes, it was the desire of the city to annex the area and not the area to be annexed.

Q. All right. And so there was a good deal of ill will there or hard feelings and you think you can take those people in over their desires and then suddenly in two months tack on an additional cost to them? As a man dealing with the public do you want to tell the Court that could be done?

A. I think I would have to answer a question with a question. Do you think it would be reasonable to ask that this matter be delayed until that had been done?

Q. I think the only reasonableness -- I am glad you asked the question. It gives me a chance to testify. I think the only reasonable way -- and again I will put this not as a representative of industry but as a citizen of St. Joseph. I think the only reasonable way to handle this matter is to give the citizens of this community a reasonable time, and I am not prepared to say what is a reasonable time, but a reasonable time to re-orient their thinking, to give the leaders of the community an opportunity to educate the people, particularly these new 10,000 who are annexed, to get our figures together, to assemble all the cost data, to explain to these citizens, when this city is competing for industry with St. Louis and Kansas City, why we must go to all these additional costs for four or five years before those two downriver cities do. We can't go to industry very well and say, "Look, we have got all these additional costs. You go to Kansas City or St. Louis and escape for five years, maybe ten years."

A. I thought that --

Q. Further, I don't think it is reasonable when you have not completed arrangements at Omaha and you are having trouble at Sioux City. Now, all I am asking is, I think there should be a reasonable time to work it out.

A. I am surprised at this problem of selling industry on this matter. It has been my understanding that industry was rather progressive and had already done much of this.

Q. Industry has, certain types of industry, there is no question about it. On the other hand, there is a lot of industry that looks at their costs in coming into a city, as you well realize. Isn't it true that there is no completion date for Omaha?

A. There is a completion date for Omaha.

Q. For all of their works?

A. Yes, sir.

Q. Don't they have to pass a 16 million dollar bond election next year?

A. I think you are slightly high in your figure. There is a bond issue coming up in May, but the city has already committed itself to a contract award and completion date for the new improvement.

Q. But the bond election doesn't even come up until May.

A. The City of Omaha elected to handle their bond issue in two stages. It was made unmistakably clear at the first election for the part that is now progressing that that multimillion dollar expenditure would not abate one iota of pollution, it would just move it farther downstream to where they were going to build a treatment plant, and I don't believe it would be reasonable to assume that the City of Omaha would want to spend about eight million dollars from which there would be no benefit at all unless they were going to spend the remainder of the fund to provide some benefits.

Q. I will take your term "reasonable". I agree with that. But the fact is that the Omaha election is not until May and according to the testimony here is this not correct, until the upstream pollution is stopped there will still be pollution at St. Joseph and Atchison above the tolerable limits?

A. There will still be pollution of the Missouri River until each of the major cities does its part.

Q. I said above the tolerable limits. Exhibits 24 and 25, if I remember them correctly, show very definitely the doctor's line -- showed the extension of the pollution from up above still -- have you got 24 and 25?

A. That does not -- I think we must have a difference of our understanding of your question. The chart that you referred to made no projection of reductions by treatment. I interpreted your question as upstream after treatment.

Q. No, no. I mean before treatment. Until -- what I said was until it is cleaned up upstream, reduced by treatment, we will still have pollution here and at Atchison, won't we?

A. Yes, until it is cleaned up. I believe there is ample evidence of good faith and good progress upstream.

Q. But factually we will have pollution until they pass their bond issue and get their money and complete their plans, that is right?

A. Yes.

Q. And their bond issue doesn't come up until May?

A. That is right.

Q. Do you think we can explain to the citizens of this community in a logical answer why we must act by November 15th when Omaha doesn't have to act until May?

A. I don't think that would be difficult to do.

Q. You don't think so?

A. No.

Q. Will you come up here and explain it?

A. If officially requested, I will be glad to help.

Q. You are a citizen of Missouri. Would you come up -- this is for the benefit of all Missouri -- would you explain the logic and reasonableness to these people? I will tell you what I will do, I will arrange a meeting if you come up here.

A. I said if officially requested I would attempt to.

Q. Suppose I just request you unofficially as a fellow Missourian?

A. I can not honor all such requests. We are sort of relegated by law in working relationships with states to honor only official requests.

MR. STEIN: Mr. Chairman, we have really enjoyed this colloquy.

MR. BROWN: That is all. Thank you.

MR. STEIN: But I might remind that Mr. Hopkins is a Commissioned Officer of the Public Health Service and not available to make all sorts of commitments.

CHAIRMAN SAMSON: All right.

Mr. Schoenlaub?

MR. SCHOENLAUB: I have one more question.

## RECROSS EXAMINATION

BY MR. SCHOENLAUB:

Q. Mr. Kittrell yesterday stated that he could not state that even though the pollution north of St. Joseph were abated from municipalities and the industries that we would not still have water in the Missouri River at St. Joseph which would be above the level recommended for general recreational purposes, water supply source and swimming. Do you wish to comment on that statement?

A. I think that that is a very parallel question to the one asked by one of the Board members earlier. It is my opinion that the treatment program of the Missouri River when carried out at the communities upstream from St. Joseph, that the coliform levels then prevailing will approach, if not meet, the standards for water supply.

Q. But you don't know whether it will meet the standards?

A. I don't think that anyone could say they knew whether it would or would not. I gave an opinion.

MR. STEIN: Mr. Chairman, I had not noticed any standards put in for water supply.

MR. SCHOENLAUB: They are right up there on that exhibit.

A. Objectives.

MR. STEIN: "Objectives" was the word, as I read it. May we have that --

MR. SCHOENLAUB: Well, I am not familiar with your terminology. If you want to use the word "objectives", I will.

A. "Objectives" (indicating).

Q. (By Mr. Schoenlaub) I will use your term. But you could not say that we would be able to swim in the Missouri River immediately outside of town even though Sioux City and Omaha did provide primary treatment plants?

A. You will be able to swim in the Missouri River, yes.

Q. Without any danger from the coliform count being above the thousand level?

A. If it were below the thousand level it would still be -- there would still be danger.

Q. In other words, the Missouri River is going to be a health hazard regardless of whether or not Sioux City, Omaha and St. Joseph provide treatment?

A. I think we said a potential health hazard, and it would be a substantially reduced potential health hazard with treatment as compared to its present state.

Q. But it would not be within your recommendations or objectives even though they did provide these plants upstream?

A. I would not personally recommend to people that they swim in the Missouri River with or without sewage treatment. Nevertheless, people do.

Q. And you don't know whether they would even be able to boat safely at such a time?

A. The boating standard is the same, or objective, is the same as the water supply objective. I said that was my judgment that the treatment upstream would effect reductions to approach, if not meet, that objective.

Q. But you don't know whether that objective would be met?

A. I do not know whether it would or whether it would not.

Q. But you are hoping that it would?

A. I think that that is a rather good summary of the position of the five State Health Departments, in the testimony read by Mr. Smith this morning, that they would carry forward this program and as the results were accomplished they would evaluate those results and the significance of the residual pollution, including the validity of the objectives.

Q. Will your department be satisfied with a primary treatment plant, if one is built, at St. Joseph or will you be coming back a few years from now and saying, "We have found that that won't work, you are going to have to have a higher degree of treatment. Therefore, you are going to have to spend another two million dollars"?

A. The Public Health Service has never suggested a specific level of waste treatment for any of these communities on the Missouri River. We have and are suggesting abatement measures subsequent to the approval of the State Water Pollution Control agencies.

Q. But you are not certain that those would remain satisfactory types of treatment?

A. To the best of my judgment, within the foreseeable future they would be satisfactory.

Q. What do you classify as "the foreseeable future"?

A. The economic life of the sewage treatment plant.

Q. That is assuming that there are no major repairs made to it? I mean a plant, I assume, properly cared for would have an indefinite economic life.

A. Many communities have found it necessary to rebuild sewage treatment plants even though there was not significant growth, processes change or improved. Usually the --

Q. Are you talking of approved processes change?

A. Yes.

Q. Is there a possibility of that happening here?

A. Somebody might come up with a better method of sewage treatment. I doubt if they are going to do it in the next year or two.

Q. A year or two isn't going to help. It is going to take 20 or 30 years for the City of St. Joseph to get this paid off. Now, the question I have is whether or not before we get this plant paid off we will be required to make major changes in the plant at an additional cost?

A. It is not my belief that a higher degree of treatment would be specified by the State Water Pollution Control Agency of Missouri in a reasonable number of years, in the foreseeable future.

Q. There again, what, in your opinion, do you consider a reasonable number of years? I mean in my mind it could mean four or five, ten, twenty, a hundred.

A. I see nothing that would indicate a higher degree of treatment until either the population and industries of the area had significantly increased by growth, a growth that at normal rate would certainly encompass 20 years, or by an even greater increase in the recreational use of the river than has been indicated by the increases in the last few years.

Q. Can you guarantee, then, to the people of this city --

MR. EDELMAN: Mr. Chairman, I suggest this is going rather far afield. He is not only asking the witness to predict the future but to guarantee it.

MR. SCHOENLAUB: I will withdraw it.

MR. EDELMAN: I submit that under no stretch of the imagination is Mr. Hopkins qualified for the latter.

CHAIRMAN SAMSON: Sustained.

Q. (By Mr. Schoenlaub.) Can you in your own personal position assure the people of the City of St. Joseph that they will not have to make major changes because of changes in objectives and methods --

MR. STEIN: Same objection, that it hasn't been changed, an assurance is the same as a guarantee.

CHAIRMAN SAMSON: Let him finish his question, if counsel please. Have you finished your question?

MR. SCHOENLAUB: Well, to satisfy them, I will change that.

Q. (By Mr. Schoenlaub.) Do you think?

A. I could give you no assurance because the agency in Missouri responsible for such a determination is the Division of Health. I can make no commitments.

Q. Do they not work closely with your department?

A. We have a close working relationship, yes.

Q. Does your department have any changes in objectives and methods anticipated within the next 20 years?

A. No, Sir.

Q. As far as your department is concerned, you would not recommend to the State Health Department that they institute such changes within the next 20 years?

MR. EDELMAN: Objection, Mr. Chairman.

A. I can not predict my department for the next 20 years.

CHAIRMAN SAMSON: Mr. Hopkins, just a minute.

MR. EDELMAN: Mr. Hopkins is not the department. He is a representative of the Surgeon General. I suggest that counsel limit his questions to his personal --

CHAIRMAN SAMSON: Are you making an objection in that connection?

MR. EDELMAN: Yes.

CHAIRMAN SAMSON: Sustained.

Q. (By Mr. Schoenlaub.) Then it is your objective to reduce the pollution in the Missouri River, not to eliminate all of the pollution of the Missouri River?

A. That is right.

Q. So you will take no action against the stock farmers in the immediate vicinity of St. Joseph on tributaries of the Missouri?

MR. STEIN: Objection, Mr. Chairman. The question of Mr. Hopkins taking action in his individual capacity is impossible against farmers or anyone else unless he owns some property downstream and sued privately as a property owner. He certainly can not speak for the department, and for that reason we object.

CHAIRMAN SAMSON: If he can answer, I will let him answer, subject to that objection.

A. If I had evidence I considered reliable that indicated that such a livestock or farm operation was a significant contributor of pollution to the Missouri River so as to be detrimental to health or welfare in another state, I would recommend to the state agency that it give the matter due consideration.

Q. (By Mr. Schoenlaub.) Did you state that any pollution is detrimental, that there is a possibility of danger to the heatlh of people in the Missouri River?

A. I don't think I made quite such a broad statement. I think I said that any level of pollution, as for example the objectives quoted on the chart here, was not a guarantee of an absence of danger.

Q. So that there is no guarantee of an absence of danger even though all of the municipalities along the Missouri River treat the sewage?

A. There is no such guarantee.

Q. In other words, we can't expect a safe stream to swim in when you finish with Sioux City and Omaha?

A. You can expect a much safer stream. You can not have a guarantee of no danger.

Q. So that the Missouri River would be able to serve no purpose which it can not safely serve at this time?

A. I would say that it would be in much better position to serve more safely those purposes which it now serves.

Q. But still there would be that possibility of disease and --

A. There will always be some possibility of disease as long as we are working around sewage.

Q. On the Missouri River?

A. I won't limit that to the Missouri River.

Q. How long has there been danger of disease in the Missouri River, to your knowledge?

A. I am slightly over 50 years of age --

Q. And from the records and reports of your office.

A. I think Mr. Metzler testified that there was sufficient concern by the State of Kansas that in 1910 they requested the Public Health Service to make an investigation of pollution in the Missouri River because of the hazard to water supplies at Atchison, Topeka, and Kansas City, Kansas -- I mean Atchison, Leavenworth, and Kansas City, Kansas, so I know that it has gone at least that long.

Q. Would you comment on a statement or what would be your opinion of a statement to the effect that over 100 years ago the water in this city came from wells because the Missouri River wasn't fit to take water for drinking purposes out of?

A. I think that over 100 years ago the water purification processes for even unpolluted streams had not advanced to the point where municipal water supplies were very prevalent.

Q. Would you recommend swimming in a river you couldn't drink out of?

A. No.

Q. So then even 100 years ago you wouldn't have recommended swimming in the Missouri River?

A. I would come much nearer recommending that 100 years ago when there was only a small segment of the people discharging sewage to the river that now discharge sewage to the river.

MR. SCHOENLAUB: I believe that is all, sir.

CHAIRMAN SAMSON: Any other questions? Mr. Brown?

MR. BROWN: No, sir.

MR. WILCOX: Mr. Chairman.

CHAIRMAN SAMSON: Mr. Wilcox, go ahead.

MR. WILCOX: May I ask a question as a citizen of St.Joseph rather than representing any company particularly?

Q. (By Mr. Wilcox.) Mr. Hopkins, in this last bond campaign of March 1958 you and I worked pretty closely together in promoting that, did we not?

A. I would not say in promoting it. In carrying it off.

Q. Well, in carrying the educational program off?

A. Yes.

Q. Tell me now what is the time schedule as far as Kansas City is concerned?

A. At the conference held by the Kansas City metropolitan area, I believe it was in December of '57, as a parallel to the step that was held over in June of '57, a schedule was established whereby the city would arrange financing by the fall of '59. I am not sure whether it was the last of September or the first of September.

It is September '59.

Q. And has any such financial arrangement been made in Kansas City yet?

A. It has not.

Q. Is there any deadline as to when they have to make such arrangements?

A. As I just mentioned, the deadline was established as September '59.

Q. Oh, September?

A. Yes.

Q. I thought you said the fall. Excuse me.

A. Yes.

Q. And you will recall that in the campaign that you and I worked on, the bond campaign of '58, that we had a number of questions at that time as to why St. Joseph was voting on bonds for this sewage situation and river pollution abatement when Kansas City had not been required to do it? Do you recall that?

A. Yes, sir.

Q. Well, now, considering that, and assuming that by the September date you mentioned that Kansas City has taken no action, and we are required here in St. Joseph under Item 3 to have our bond issue passed by November 15th, don't you consider that that would have a very disastrous effect on any bond campaign here in St.Joseph for this purpose?

A. Mr. Wilcox, you have added about six questions here together, or at least I followed them improperly. You brought in the matter of the reasons St. Joseph was being asked to hold a bond election before Kansas City had. As you remember, our explanation of that was that as a natural sequence the clean-up program started upstream and worked downward and that, because of the time factors involved, the schedule was not established for Kansas City until substantially after one had been established for St.Joseph.

Now, as to the arrangement of financing in Kansas City, the election has not yet been held. It has received much consideration in the public press and I know some deliberation by the City Council. I can not say that Kansas City will be in default of the September schedule.

Q. However, if they are in default, of course there can be no procedure that would require them to even set an election date before we have one prior to November 15th of this year?

A. I have no reason to believe that Kansas City will not hold an election by the time of the date that is set here. At the same time, I have no assurance that they will.

MR. WILCOX: Thank you.

CHAIRMAN SAMSON: Go ahead, Mr. Schoenlaub.

Q. (By Mr. Schoenlaub.) You state that in your opinion it is reasonable to follow the normal sequence with the Kansas City bond issue -- the Kansas City treatment plant coming after the St.Joseph treatment plant, that St. Joseph's plant should be in existence prior to the Kansas City plant?

A. I don't believe I quite said that. I said that our program started upstream and worked downward.

Q. And that, therefore, Kansas City came after St. Joseph?

A. Yes.

Q. Do you know what the date for completion of the Sioux City plant is as it stands now?

A. I don't have the information with me. It was established in the order of the Secretary pursuant to a recent hearing there. I am sure that there is someone here in the room that has that date, if you wish --

Q. Well, there again, using that same reasoning for Kansas City coming after St. Joseph, wouldn't it be just as reasonable for the time schedule of St. Joseph to be geared with that of Sioux City as it was to gear Kansas City with St. Joseph?

A. I believe that the time schedule for the completion of the construction contained in my recommendation to the Board provides for completion of sewage treatment works upstream at about the same time or before this here.

Q. You have no idea whether Sioux City is to have theirs completed?

A. It is my opinion that it is to be completed early in 1962 or late in 1961. I would invite reference to the Secretary's findings, --

MR. SCHOENLAUB: Do either of the counsel have that information?

MR. STEIN: Yes.

MR. SCHOENLAUB: What is the date?

MR. STEIN: What is the question?

MR. SCHOENLAUB: What is the date of Sioux City?

MR. STEIN: Which date do you want?

MR. SCHOENLAUB: Completion.

MR. STEIN: Completion and in operation? By January 1, 1963, construction of all remedial facilities shall be completed and such facilities be in operation.

MR. SCHOENLAUB: What about their bond issues?

A. They do not have --

MR. STEIN: They don't need a bond issue.

MR. SCHOENLAUB: What about the completion of their financing arrangements or was there such? That was the question that I wanted answered.

MR. STEIN: They don't have that problem in Sioux City.

Q. (By Mr. Schoenlaub.) Now, assuming that January 1963 --

MR. STEIN: That is correct, sir.

Q. (By Mr. Schoenlaub.) -- their plant should be in operation, would it not be reasonable under your line of reasoning for St. Joseph-Kansas City to set the completion date for St. Joseph's plant as far in the future from Sioux City's as you did Kansas City's from St. Joseph's?

A. If there was a good and valid reason to take longer than two years in construction at St. Joseph I would think an adjustment could be indicated. There was, in my opinion, a good and valid reason for a longer construction period at Sioux City, Iowa. It was in connection with their flood control problem on the Floyd River.

Q. And you don't think that a greater assurance of passage would be such a reason for extending that period?

A. I don't believe that stretching that out would in any way implement the chances of passage.

MR. SCHOENLAUB: That is all.

MR. BROWN: I have no further questions.

CHAIRMAN SAMSON: I have just one or two questions, Mr. Hopkins, and they will be short.

Q. (By Chairman Samson.) You testified to an item of $5,950,000 for interceptor and treatment and pumps, is that right, for the construction of such items?

A. That was the figure in the March '58 bond issue here at St. Joseph.

Q. Did that take into consideration the processing of so-called pollution from the industrial area south of town?

A. Yes, that included -- one million of that five-plus million was for industrial wastes to be paid for by the industries.

Q. In other words, the industry would pick up the tab for about one-sixth of the nearly six million dollars, is that right?

A. Yes. The industry would make no use of the interceptor sewers and pumping stations, which costs far more than half of the total bill.

Q. Very well. Now, what contribution would the City of St. Joseph, Missouri, be entitled to under the federal grant.

A. The project here would certainly constitute an eligible project within the meaning of the Federal Act. As you, I am sure, are familiar, our federal law says that the allocation of moneys among applicants within a given state shall be determined by the State Water Pollution Control Authority on a basis of economic -- on a basis of financial and water pollution needs. I would not be in a position to ask -- not be in a position to tell you what priority St. Joseph would be entitled to under the state program.

Q. I certainly appreciate that. But they would be entitled to some federal assistance under the Federal Act, wouldn't they?

A. It would be an eligible project, yes.

Q. Would that amount to possibly in excess of a quarter of a million dollars?

A. As I see it, it would be a quarter of a million dollars.

Q. Of course, if these programs were divided into different phases, each program could possibly be entitled to a $250,000 grant, is that correct?

A. That would be possible, but within the limitations of the money that is allocated to Missouri I don't think it would be probable.

Q. Now, I am interested just a little bit in this election that we had -- that the City of St. Joseph had in March of 1958. Generally are you acquainted with what the editorial policy was of the local press?

A. I read the papers.

Q. And was that, so to speak, a friendly press to the issues involved? Did they take a position editorially on the problem, if you know?

A. It became increasingly favorable to the bond issue as the head of steam of the publicity program was generated and I think if that had lasted another week it might have been enthusiastic.

Q. Might have got the job done. Now, Mr. Hopkins, what about radio and television, generally did they support the problem involved, to your knowledge?

A. I think it gave -- received very good support of the radio and television. If it were not for some of the complicating factors, should we vote money for sewers to a new area that we are not even sure is going to be annexed and should we use sewer service charges now to extend sewers, whereas the rest of the sewers in the city had been built by a different basis of financing, I am confident in my own mind that the bond issue would have passed.

Q. Now, Mr. Hopkins, I have heard it said somewhere that there was a scatter sheet that came out the day before the election. Are you familiar with that?

A. I did see it.

Q. A little yellow sheet?

A. I did see it.

Q. And generally was that detrimental to the issue involved?

A. I am sure that it discouraged some people from voting for the bond issue.

Q. Do you have any idea where that came from?

A. I would be unable to say with any certainity as to where it came from.

CHAIRMAN SAMSON: I have no further questions.

MR. KURYLO: I have, if I may, at this time.

Q. (By Mr. Kurylo.) The total cost of the interceptor sewers and the treatment plant is around five million three hundred thousand dollars?

A. That is the estimate of the estimated cost adjusted to today's prices, exclusive of capacity in the plant for the industrial wastes outside the city.

Q. Excluding the capacity for the industrial wastes outside the city?

A. Yes.

Q. The additional -- there would be a million dollars additional --

A. Yes.

Q. -- on the cost of the treatment plant which is not included in this five point three million dollars?

A. That is right.

MR. KURYLO: I understand.

CHAIRMAN SAMSON: I have no further questions.

And if there are no further questions, you are excused.

MR. KURYLO: May I ask another point here, though.

Q. (By Mr. Kurylo.) The bond issue in 1958 included a million dollars which would be reimbursed by the industries, would it not?

A. Yes.

Q. And there is no need for such an arrangement this time, that is voting a bond issue including a million dollars which industry is apparently ready and willing to put forth as soon as local action can be consummated?

A. I can only assume that under the prior arrangement industry intended to pay for its part of the plant on an installment plan, shall we say, a monthly cost. So that, therefore, the cost of the industrial allocation to the plant was included in the total bond issue. If -- I would not want to leave the impression that industry has committed itself to laying cash on the barrel for its part of the program. To my knowledge there has never been any discussions of that aspect.

MR. KURYLO: No further questions.

MR. BROWN: May I ask a question?

CHAIRMAN SAMSON: Surely.

## RECROSS EXAMINATION

BY MR. BROWN:

Q. Mr. Hopkins, you are aware of the fact that industry in no uncertain terms and substantial terms said, "We will pay one million dollars and pay half of the maintenance costs"?

A. Yes, sir, as I understand it a firm agreement was raised in that regard.

MR. JOHNSON: He is just saying not cash.

MR. BROWN: Well, you don't put the cash down until something is done.

Q. (By Mr. Brown.) But I mean the offer came from industry well able to raise the million dollars?

A. Unquestionably.

Q. And whose word has always been good?

A. And I believe that the plan of paying on a deferred basis, if you want to call it that, was fully acceptable to the City Council.

MR. BROWN: That is all. Thank you.

CHAIRMAN SAMSON: I might say, Mr. Brown, that I don't think there is any question in the Board's mind but what that was the situation.

MR. BROWN: Yes.

CHAIRMAN SAMSON: Thank you.

MR. JOHNSON: Mr. Brown, I just wanted to clear up that my understanding was that it was on a deferred basis and not on a cash basis all at one time.

MR. KURYLO: You see, I didn't understand that and that is why I wanted to clear up that it was necessary to have a bond issue of a million dollars which industry was willing and able to put forth. It has now been explained to me.

CHAIRMAN SAMSON: You may proceed, Mr. Stein.

(Witness excused.)

MR. STEIN: The Government has concluded the main portion of its presentation.

CHAIRMAN SAMSON: Am I to understand then, that the Government rests?

MR. STEIN: Well, we would like to rest our main portion of the case, but if Board or counsel wants that we call any of our witnesses who are here, we will be glad to make them available again.

CHAIRMAN SAMSON: Very well. My question, though, was, the Government is resting their case?

MR. STEIN: Yes.

CHAIRMAN SAMSON: Does anyone appearing for either of the States of Kansas or Missouri want to present any evidence?

The City of St. Joseph?

MR. SCHOENLAUB: We have no witnesses, your Honor.

CHAIRMAN SAMSON: Do you have any evidence of any kind that you care to produce, Mr. Schoenlaub?

MR. SCHOENLAUB: No.

CHAIRMAN SAMSON: Now, industry, you may proceed, Mr. Brown.

MR. BROWN: Thank you. We have some very brief evidence.

We would like to offer in evidence and read in the record the statement of the position of industry which was issued to the paper. I think it will be helpful to the Board. It was printed in the paper on Sunday.

I have a very illegible copy here and that is the reason I prefer to read it and then it will be in the record.

CHAIRMAN SAMSON: Very well. Do you care to offer the original as an exhibit also?

MR. BROWN: Well, I will furnish you an original. I don't have a copy here. Neither one of these is such that you could read them unless you understood the -- you could read this one, but there is a paragraph in the Thermo-Fax copy which was not well done added to this.

CHAIRMAN SAMSON: Very well.

MR. BROWN: But I will furnish a complete copy.

CHAIRMAN SAMSON: You may proceed.

MR. BROWN: "The industries operating in the so-called industrial area adjacent to the city limits of St. Joseph and in the stock yards area feel that certain facts concerning the question of water pollution by them should be made public. There are approximately 21 industries operating in that area which may be termed the industrial group. Perhaps 10 of these industries produce little sewage which finds its way to the Missouri River. Four of the remaining industries add little to that. There are 7 industries which account for the major portion of the discharge from that area into the Missouri River.

"The 1948 Congress enacted the so-called Water Pollution Control Act, under the provisions of which it was intended that certain pollution of interstate streams should be curtailed or stopped. At the present time a hearing is being held in St. Joseph to determine whether or not the City of St. Joseph and the adjacent industrial area are or are not guilty of violating that law and whether or not steps should be taken to enforce the construction of a sewage treatment plant to stop the pollution of the river.

"The industrial group admits quite readily, and has admitted, that it does dump into the river through the sewers certain waste products and sewerage. There can be no question but that the city, through its sewers, all of which empty into the river, introduces the city sewage and waste material into the river also.

"Most of the members of the industrial group have operated adjacent to St. Joseph for many years. They have formed a strong part of the economic life of the community and they have contributed materially to it. At no time prior to the enactment of the federal law was there any complaint that they were polluting the Missouri River and so far as we know there was never any such complaint from cities lower down on the river that St. Joseph and its adjacent industries were causing them trouble by polluting their water supply until in the early 50's when the matter was taken up and agitated under the provisions of the pollution law.

"Admitting, as we do, that waste materials and sewage do reach the river from our various plants, the members of this group have caused to be made independent surveys of the sewage problems of St. Joseph by a competent engineering firm. In 1955 a supplemental sewerage report was submitted by Black and Veatch, consulting engineers of Kansas City, Missouri, following an exhaustive study of the situation here made by their technicians. That survey showed that there were problems which had to be considered.

"In the first place, to take care of the city sewage, interceptor sewers must be built at great expense from the northwestern edge of the city to the proposed sewage treatment plant which would be located near the stock yards area. It would also be necessary to construct pumping stations. That entire construction would be solely for the benefit of the city. Quite obviously, since it would in no way serve the industrial group or its members, that portion of the expenses would not be charged against the industrial group.

"According to Black and Veatch, the cost of the interceptor sewers, pumping stations and the plants for the sole purpose of taking care of the city's need would amount to several million dollars. Black and Veatch then estimated that to increase the size of that plant to take care of the discharge from the industrial area would cost $836,000.

"As of August 26, 1957, the industrial group notified the then mayor of St. Joseph that they would pay one million dollars towards the construction of the sewage plant and that they would bear one-half of the annual maintenance cost. Apparently this offer was considered proper by the then government, for on November 5, 1957, in a letter addressed to John Bennett, President of the St. Joseph Stock Yards Company, Mr. Dale stated that the proposal had been discussed with the Common Council, that they felt the proposal was acceptable, but that they could not act on it at that time; that when an election date had been decided upon they would attempt to work out a solution. It is common knowledge that there was an election and the bond issue was defeated.

"In 1959 Black and Veatch made a further study of the waste problem in the industrial area. In the meantime, the various industries operating in that area, at considerable expense to themselves, had undertaken to clean up their own industries and at the time of the last Black and Veatch report the amount of solids discharged through the sewers from the industrial area and the daily gallonage had been reduced materially.

"The industrial group has felt that it was more economical and more logical to construct one treatment plant than to construct separate plants, and it is still of that opinion.

"This group felt that it had made a very fair offer and in view of the fact that the discharges from its plants are now materially lessened, it would seem that they were extremely fair in the offer made by them. The industrial group still feels that one sewage plant to serve both the city and the industrial area is the logical solution of our common problems and they stand ready to pay their proper share to the best of their ability when and if it is determined what pollution is occurring in this area and the solution of the problem as mutually agreed upon by the city and the members of the industrial group.

"As evidence of the group's good faith and intentions it did on May 19, 1959, address a letter to the Mayor of St. Joseph and the members of the Common Council stating that it was ready and willing to discuss this problem at any time at the convenience of the Mayor or the council.

"The members of this group have been and are aware of the problem and its magnitude. They have been and are, at considerable expense to themselves, studying corrective measures. They have been and are, at further expense to themselves, taking steps which are lessening the problem. They have been and are willing to cooperate, but if cooperation is not desired they will have no alternative except to seek their own solution of the problem".

Now, I have discussed this with counsel for the Government. I have here statements from the seven industries which are chiefly concerned as to what has been done and rather than call somebody from each concern independently I would like to read these into the record.

CHAIRMAN SAMSON: That is very well. You may proceed, Mr. Brown.

MR. BROWN: This is from the Seitz Packing Company.

"In regard to the efforts of" --

CHAIRMAN SAMSON: Mr. Brown, may I interrupt you just a moment? Is it your idea that you will leave these with the secretary?

MR. BROWN: I can leave them. Very well.

CHAIRMAN SAMSON: As exhibits and have them marked as exhibits?

MR. BROWN: Well, we will mark this --

CHAIRMAN SAMSON: Why don't you mark your first exhibit there, oh, Industry Exhibit No. 1?

MR. BROWN: Industry Exhibit No. 1.

CHAIRMAN SAMSON: I think Mr. Ayers will be very happy to mark them. He is not working too hard at the moment.

MR. BROWN: All right. He has had an easy time here.

Mr. Ayers, will you mark this Industry Exhibit 1.

CHAIRMAN SAMSON: Let's take a five or ten minute recess at the moment, gentlemen.

(RECESS)

(Industry Exhibits 1 to 7 inclusive marked for identification.)

CHAIRMAN SAMSON: The Board will reconvene.

MR. BROWN: This is the statement of the Seitz Packing Company.

CHAIRMAN SAMSON: What is your exhibit number, Mr. Brown?

MR. BROWN: Industry Exhibit 1:

"In regard to the efforts of this company to alleviate the pollution of the Missouri River by its sewage, the following measures have been instigated:

"(1) The company has discontinued the curing of hides at its Lake Road and Packers Avenue plant. This will eliminate several tons of salt and hide trimmings which previously found their way to the river.

"(2) The company has requested estimates for the construction of a clear water sewer in order to reduce the volume of water that would need to be treated.

"(3) It is conducting experiments on methods for the removal of the paunch content of the cattle slaughtered so that this material will not go into the sewage system. The removal of this paunch content will amount to some 6,000 or 7,000 pounds per day of semisolid material.

"(4) The company is studying the possibility of adding additional grease settling basins for more complete removal of grease from its sewage.

"If I can be of further help to you in this matter, please do not hesitate to call."

Exhibit 2 is from the Terminal Warehouses of St. Joseph:

"In June of 1957 a conference on interstate pollution in the Missouri River was held in St. Joseph. At that time we were asked to stop putting certain materials into the sewer.

"Standard Brands leases space from us to operate an egg breaking plant. During the year 1958, it is estimated that there were 1,100,500 pounds of egg shells disposed of that formerly went to the sewer.

"In our Rendering operations, we stopped dumping paunch material into the sewer. It is estimated that the 1958 volume amounted to 436,645 pounds.

"About this same time in 1957, we installed a 6-section catch basin to screen out and catch solids and grease.

"All of the above has helped considerably to lessen the amount of material going to the sewer and pollution of the Missouri River.

"Would also like to add that in 1953 we ceased operating the poultry killing operation."

CHAIRMAN SAMSON: What is the date of that?

MR. BROWN: 1953. "Prior to 1953 feathers from the operation were dumped into the sewer.

"From the above you can see we have reduced to a minimum the suspended solid content of waste going into the sewer."

Exhibit 3 is from Armour and Company:

"As per the suggestion of the committee we are listing below three or four of the main items that we are exercising at the South St. Joseph Plant for the elimination of pollution in our regular operations.

"(1) Since the original conference on water pollution back in 1957, we now haul all of the manure from our livestock holding pens to the dump and the best estimate we can give on this is approximately four tons per day.

"(2) Through conservation and change in operations we have lowered our daily water consumption from 2,300,000 gallons to 1,900,000 gallons and we are quite sure we can reduce this to 1,500,000 gallons. We appreciate this has not had too much effect on pollution but certainly does have effect on the flow demand.

"(3) Our settling basin, which is a basin 15 feet wide and 65 feet long, is now complete and in good operating condition. We channel practically all of our packing house water through this basin which is so constructed that the top flights draws off all the floating greases, while the bottom flights draw off all the settled solids. These go to a sump at the inlet end. A cross collector concentrates the solids in one side of the basin. From here they are pumped to a rotary screen. The liquid passing through the screen goes to a sewer while the solids retained on the screen and the grease collected by the top conveyor flights are forced through a pipe by steam back to our inedible rendering facilities. This, in our opinion, efficiently collects the larger part of the solids.

"(4) In addition to this we have expanded and concentrated on the complete dry cleaning of all departments before the wash-up operations, thereby keeping all greases possible out of the sewerage water.

"We hope this material will be used to advantage in your report."

Exhibit 4, the Anchor Serum Company:

"This company operates in the stock yards district where it produces anti-hog-cholera serum and other animal biologics under U. S. Veterinary License No. 124.

"Hogs, cattle, sheep, dogs and rabbits are kept in pens under sanitary condition on concrete floors.

"By change in procedure and in its effort to minimize the amount of solids into sewers, this company in a 12-month period preceding July 1, 1959, have dry cleaned their pens and have hauled away approximately 1,872 tons of livestock waste."

5 is from St. Joseph Stock Yards Company:

"The St. Joseph Central Public Live Stock Market operated by the St. Joseph Stock Yards Company ranks among the major livestock markets in the country. Since the hotel guests of the company require water and also the elimination of organic wastes, this stock yards district contributes waste water and some solids at several points within the sewer system serving that area.

"Since July, 1957, improvements have been made in housekeeping methods in line with suggestions from the state health and federal health authorities.

"For example -- from July 1, 1958 to June 30, 1959, the St. Joseph Stock Yards Company shipped over 300 carloads of organic livestock waste to various points throughout the country for processing, mushroom growing, and other uses, amounting to 28,922,550 pounds or 14,461 tons.

"During the same period in the hog division 815,200 pounds or 407.6 tons of corn and fecal matter were dry cleaned and removed from the area.

"In this same period the Nebraska Fertilizer Company, a processer of organic wastes, operated and continues to operate a plant on leased property from the St. Joseph Stock Yards Company. This plant sells raw manure to vegetable and tobacco growers, stores this same manure for composting, ships a partially composted product to other processers, and also processes and ships a finished partially dehydrated commercial product.

"The waste from the hog division, plus materials handled by Nebraska Fertilizer Company, in addition to that spread on farm land for fertility purposes, amounts to 20,500,000 pounds or 10,250 tons of organic waste.

"During this same period there has been some increase in the amount of water used by the St. Joseph Stock Yards Company but as indicated in the Black and Veatch report of May, 1959, much of this water is being discharged into the sewers as clear water. In other words, during the period of July 1, 1958 to June, 1959, 25,118.6 tons of organic waste and corn which at one time went into the Missouri River are now being removed at a tremendous cost to the company to meet the requirements set out by federal and state authorities."

Exhibit 6 is from the American Cyanamid Company:

"American Cyanamid Company, a corporation with offices at 30 Rockefeller Plaza, New York 20, New York, owns approximately 20½ acres of land in South St. Joseph, Missouri, on which it operates a plant for the manufacture of a serum used in the prevention of hog cholera. This plant consists of an office, laboratory and hog pens in covered buildings with concrete floors in which approximately 800 animals are kept. In winter, a portion of each pen used has a very light covering of sawdust bedding.

"The waste from this plant consists of sanitary sewage from 34 employees, hog excreta and bedding from the hog pens, wash water from the pens and equipment, large quantities of cooling water and rain water runoff.

"This waste is carried off through a 12-inch gravity feed main into the Missouri River. There is also a 6-inch force main through which the waste is pumped on rare occasions when the river is too high to receive the contents of the 12-inch gravity line. The two lines are never operated simultaneously.

"Cyanamid has been actively engaged in studies of stream pollution abatement and a program for disposal of plant waste from the South St.Joseph facilities since 1954. For more than 30 years, Cyanamid's sanitary engineers have engaged in air and water pollution control activities. This work continues today at some 50 plants throughout the United States. It is, therefore, neither a novice nor a newcomer in this field. In some communities the company is regarded as a pioneer.

"The policy of the company has always been to operate its plants as a good neighbor and corporate citizen in the community.

"Recent studies by American Cyanamid Company and its consultants at St. Joseph, Missouri, indicate that the effluent from the plant on Lower Lake Road is a comparatively minor problem in relation to the total discharge of waste from the South St. Joseph industrial area into the Missouri River. The Black and Veatch report of 1959 (Government Exhibit 5), for example, attributes approximately one percent of such total waste to Cyanamid.

"Cyanamid's studies have also led it to conclude that waste treatment facilities which are presently in the planning stage will abate this small contribution to any alleged water pollution. The company sincerely believes that meeting the water quality control criteria which have been established by its own engineers and consultants, its program will be acceptable to the Water Pollution Control Board in the State of Missouri.

"Studies which have been made to date by independent testing laboratories, as recently as July 20, 1959, confirm Cyanamid's belief that pollution abatement is definitely possible.

"American Cyanamid Company engineers have several methods of waste disposal under active consideration. The problem of waste treatment is relatively simple because the waste is of a specific, well-defined character which is highly amenable to treatment. The waste disposal problem can be solved by improvements, alterations and changes in plant operations.

"From the toxicological standpoint, Cyanamid's waste does not present a serious health problem nor any major hazard. Nevertheless, Cyanamid intends to continue the work and studies it has undertaken in the past and is confident that results satisfactory to regulatory authorities will be achieved."

The last is from Swift and Company:

"The Black and Veatch report made for the City of St. Joseph in October, 1955, stated Swift and Company's combined city and well water usage at that time amounted to 2,240 million gallons per year. This figure was based on meter readings on city water and calculated figures on the output of our wells. Since that time, and as of March, 1959, we have made considerable reduction in our water usage. Our estimates of the reductions accomplished to date and those contemplated for the future are listed below:

"I. Reductions accomplished since 1955."

This letter is dated July 30, 1959.

"Installation of meters to accurately measure output of our wells and to give us better supervision and control of actual water pumped and used.

"2. Recirculation of well water on ammonia and air compresser jackets, reducing waste of water.

"3. Changes in processing of hog hair and wool house operations, reducing water used.

"Estimated total reduction in volume, 483.5 million gallons per year.

"4. Since 1955 we have changed our method of hydrolyzing sheep pelt trimmings, which has resulted in the elimination of solids which formerly were discharged to the sewers..

"Estimated annual reduction, 3,500,000 pounds.

"Deducting the 483.5 million gallons from 2240 million gallons yearly gives us 1756.5 million gallons per year, which is our present usage based on our meter readings for the year of 1958.

"II. Proposed future reductions.

"In addition to the above, we are now considering several process changes which, if found to be both practicable and economic, will further reduce our water consumption as follows:

"1. New process for washing and processing of sheep pelts.

"2. Recirculation and reclaiming of process water from washing sheep pelts.

"3. Recirculation and reclamation of water from the bone dryer fume scrubbers.

"Estimated total reduction, 334.5 million gallons per year.

"III. Proposed diversion.

"In the final plans for handling the sewage from this plant, we believe it will be possible to provide a clear water diversion sewer to Brown's Branch to divert such clear uncontaminated water as steam condensate, reservoir and hot well overflows, and pipeline bleeders, directly to the river so it will bypass the treatment plant.

"Estimated reduction, 308 million gallons per year.

"The total of the above proposed reductions in volume is 642.5 million gallons. Deducting this from our present flow of 1756.5 million gallons, we obtain a predicted flow of 1114 million gallons per year, or approximately 4 million gallons per day which will require treatment."

That comprises the --

CHAIRMAN SAMSON: Is counsel introducing Industry Exhibits 1 to 7?

MR. BROWN: We offer those in evidence.

CHAIRMAN SAMSON: In evidence?

Thank you.

MR. BROWN: Your Honor, that, I believe, is all the testimony we have.

MR. STEIN: May we ask a question on that, sir?

CHAIRMAN SAMSON: Yes.

MR. STEIN: On the exhibits.

You will recall that Mr. Clare, in making his computations of industrial wastes, used the 1959 Black and Veatch report which is Government Exhibit No. 5. Now, I didn't quite get from those exhibits how much of this work was done before that time and included in that and how much after that?

MR. BROWN: Most of the exhibits cover the period from July 1, '58, through June 30, 1959. In other words, they extend several months beyond the Black and Veatch '59 report.

MR. STEIN: They go before and beyond?

MR. BROWN: The Black and Veatch report, I believe, was March '59. The reduction starts back in the summer of '58, July, and continues reduction through June 30, '59.

MR. STEIN: In other words, I heard some '55 dates, substantially these reductions are reflected in the Black and Veatch report?

MR. BROWN: Substantially.

CHAIRMAN SAMSON: I should ask, are there any objections by counsel to the exhibits identified as Industry's Exhibits 1 to 7, inclusive?

MR. STEIN: No; we would stipulate that if these people were here they would so testify.

MR. BROWN: Thank you very much.

CHAIRMAN SAMSON: Very well. They will, therefore, be received in evidence.

(Industry Exhibits Nos. 1 to 7, inclusive, received in evidence.)

CHAIRMAN SAMSON: Any further testimony from any of your group, Mr. Brown?

MR. BROWN: No, sir.

CHAIRMAN SAMSON: Any further testimony from any other interested party in this hearing?

How much time do you gentlemen want for closing arguments?

MR. STEIN: Less than five minutes.

CHAIRMAN SAMSON: And how much do you want, Mr. Brown?

MR. BROWN: Do we open? Is the procedure that we open?

CHAIRMAN SAMSON: Whatever your procedures provide.

Mr. Poole has a long distance call and I have excused him to take care of it.

May we proceed in your absence, Mr. Poole?

MR. POOLE: Yes, sir.

CHAIRMAN SAMSON: Very well. Thank you.

Can counsel agree between themselves as to the procedure?

MR. BROWN: They say that they open.

MR. SCHOENLAUB: I will attempt to stay within any time limit set by the Board.

CHAIRMAN SAMSON: No, it isn't the purpose of this Board to limit in any manner, way, shape or form the evidence nor the arguments.

MR. BROWN: 20 minutes at the most will suit me.

MR. SCHOENLAUB: That will be fine.

CHAIRMAN SAMSON: Very well.

Now, Mr. Brown, on behalf of all your clients you have rested?

MR. BROWN: We have rested.

CHAIRMAN SAMSON: And, Mr. Schoenlaub, you do not care to submit any evidence for the consideration of the Board at all, is that right?

MR. SCHOENLAUB: No, sir.

CHAIRMAN SAMSON: Very well.

You may proceed with your closing arguments.

MR. STEIN: The statute provides that "Pollution of interstate waters in or adjacent to any State or States (whether the matter causing or contributing to such pollution is discharged directly into such waters or reaches such waters after discharge into a tributary of such waters), which endangers the health or welfare of persons in a state other than that in which the discharge originates shall be subject to abatement."

We believe that the evidence in this case shows the uncontroverted fact that the Missouri River is an interstate stream and that the industries in this area named in the notice and the City of St. Joseph, Missouri, are causing and contributing to pollution which endangers the health and welfare of persons in other states. The specifics of this are the interferences with water uses enumerated in the notice of this hearing.

I don't think it is necessary to reiterate this. It is to be regretted that we have to come before a Board dealing with industry and a city endowed with a wonderful river such as the Missouri River that flows by its doors, having one of the best resources available at its doorstep that this nation can bestow, a resource that affords it both its drinking water and carries away its wastes, and to see that river despoiled.

We would like to point to several specific points in the Federal statute. First, "Pollution...which endangers the health or welfare..is subject to abatement." When the term "endangers" is used in a statute the courts have generally held it to imply merely the possibility of harm and does not restrict its meaning to an act or situation wherein actual harm or injury must ultimately be inflicted. For example, in Marchese against the United States, 126 Fed. (2d) 671, at 674, the court said:

"'Endanger the safety' is a common expression to signify jeopardy without actual injury inflicted."

I think if you will check Webster's International Dictionary you will find that the dictionary has the same definition of the word.

CHAIRMAN SAMSON. What is that Federal citation, Mr. Stein?

MR. STEIN: 126 Fed. (2d) 671, at 674. I can duplicate that manyfold, but I would have to go over five minutes, if the Board wishes.

CHAIRMAN SAMSON: No, that is all right.

MR. STEIN: There is a local case which I might go into if I might be indulged, a domestic relations case, Beebee vs. Beebee, 10 Iowa 133, which says:

Under an Iowa statute providing that a divorce may be decreed against the husband when he is guilty of such inhuman treatment as to "endanger the life" of his wife, the term is not to be construed as meaning that it is necessary that the party, before seeking the aid of the court, shall wait until she is incontestably and beyond all question satisfied that there is danger to life; but the true inquiry is, whether there is a reasonable apprehension of such danger. "There may have been no act done, in the way of attempting the apprehended injury, and yet the court....see that there is danger as though there had been many attempts."

And the cases, I think, will bear that out.

Now, there is just one other point I would like to bring up in the statute and this deals with whether the matter causing or contributing to such pollution is discharged into the streams. We recognize that in this case the polluters, or the people alleged to be contributing such pollution vary from very small -- people having very small discharges to cities and industries having relatively large discharges. The statute makes no distinction between causing or contributing.

Now, we regard this, and I think if a case of this sort ever comes to court it will be considered as, a case in equity. In equity the law is rather clear and it has been held that a bill in equity may be maintained against several persons the aggregate of whose several and individual acts depositing filth in the stream results in a nuisance to property, to enjoin such acts although injury from the act of each considered by itself would be nominal. And the citation on that is Warren vs. Parkhurst, 186 New York 45, or 78 Northeast 579.

If the Board wishes, we can embark on a long and learned discussion of the legal cases supporting this point, but I do not think that that is necessary.

CHAIRMAN SAMSON: I believe that is sufficient. Thank you.

MR. STEIN: Thank you.

CHAIRMAN SAMSON: Now, have you gentlemen decided which is to go first?

MR. SCHOENLAUB: Mr. Chairman, members of the Board. Mr. Stein just stated, and correctly so, that Section 8(a) of Public Law 660 provides that the pollution we are concerned with here is that pollution which endangers the health and welfare of persons in another state or in a state other than the state in which such pollution originates.

He further stated that under that definition any pollution which brings on a mere possibility of harm is the type pollution we are dealing with here. I don't think that there would be any argument with Mr. Stein on that point.

Further in the notice of this hearing the Secretary stated that on the basis of the evidence presented at such hearing the Board shall make findings as to whether St. Joseph, Missouri, and the industrial establishments located in and adjacent to said city are causing or contributing to the pollution of the interstate waters of the Missouri River.

In the testimony of various witnesses for the Government concerning such pollution of the Missouri River there has been considerable testimony concerning the dumping of raw sewage from the St. Joseph municipal sewer system and the sewer system of the industrial areas into the Missouri River. Upon repeated questioning concerning actions taken to abate pollution caused from other sources, the witnesses unanimously agreed that no action is being taken, that though the act by its terms does apply to all sources they are specifically directing their efforts towards municipalities and industries.

I would like to further state that throughout the Government's case, and somewhere in the testimony of all of their witnesses, evidence which is irrelevant, immaterial, of a hearsay nature, and other types of inadmissible evidence was permitted to go into evidence subject, of course, to the objections. I ask the Board that in reviewing this evidence that they do give consideration to those objections and to the type of evidence on which the Government has based its case. I don't think there can be any denial of the fact that St. Joseph and the industries south of St. Joseph are discharging their sewerage into the river.

As to the effect of that pollution and the condition of the stream if such is abated, I think there should be and is considerable doubt. The Government's witnesses, specifically Mr. Clark and Mr. Kittrell, testified that even though the pollution or the discharge of sewage of St. Joseph were eliminated or abated there could still be no guarantee that the Missouri River would meet the objective level sat by the Public Health Service. And even though the dumping at St. Joseph were ceased, the dumping at Sioux City, at Omaha, and at other cities along the Missouri River were stopped, it is doubtful that the Missouri River would still -- would be able to serve any other purpose than that which it is now serving.

I could go into considerable detail as to the testimony of each witness and the specific points in their testimony that are based entirely on evidence which would be inadmissible in court and if this proceeding arrives at that stage will be inadmissible in court, but the immediate problem and consideration, I think, for this Board, the action which they will take, rests mainly on if the discharge of sewage in the Missouri River is ordered abated by this Board what time schedule would be followed. Mr. Hopkins in his recommendations by the Surgeon General has presented a time schedule which was discussed rather fully during his testimony. He further stated that at the conference held in 1957 St. Joseph was ordered to propose to the people a bond issue by March of 1958. In a conference held later that year at Kansas City they were ordered to set a date for their election by September of 1959. In answer to a question by Mr. Wilcox he stated that this course was followed because of the recognition on his part that there is a normal sequence which should be followed down the Missouri River in abating the pollution. Therefore, Kansas City should delay their action for better than a year longer than St. Joseph. And now he is requesting that St. Joseph be required prior to November, 1962 to have in operation a sewage treatment plant when the Board sitting in Sioux City, Iowa, ordered that city to have their plant completed by 1963. Following Mr. Hopkins' own reasoning in the case of Kansas City, if there is any order by this Board it should be in relation to the abatement procedures all along the Missouri River. Sioux City has been given until January 1963. If St. Joseph is required to build a treatment plant, the date for their plant should be further advanced from that of Sioux City rather than before the date set by Sioux City.

In closing, one short statement. Even though, as the witnesses testified, the City of St. Joseph by primary treatment of its discharges into the Missouri River would reduce the pollution of the river, they are doubtful that such would improve the condition of the Missouri River to their desired objectives, and even without the pollution from St. Joseph the Missouri River still could be used for no purpose other than the purposes it now serves.

Thank you.

CHAIRMAN SAMSON: Mr. Schoenlaub, I have a question or two I would like to ask you. When is the date of your next election, be it general or local in nature?

MR. SCHOENLAUB: The date of our next election November 7, 1960.

CHAIRMAN SAMSON: November 7, 1960?

MR. SCHOENLAUB: I believe so. Just a minute.

November 8, 1960.

CHAIRMAN SAMSON: November 8th? Is that the general election?

MR. SCHOENLAUB: That is the general election.

CHAIRMAN SAMSON: Do you have a primary election here before that time?

MR. SCHOENLAUB: There is a primary which should be in August of the same year.

CHAIRMAN SAMSON: August. Do you know the date?

MR. SCHOENLAUB: It would be the Tuesday after the second Monday, I think.

CHAIRMAN SAMSON: What is the cost of a local election, if you know?

MR. SCHOENLAUB: Around $12,000.

CHAIRMAN SAMSON: $12,000.

MR. JOHNSON: How much?

CHAIRMAN SAMSON: $12,000. That is for a special election, is that right?

MR. SCHOENLAUB: That is the election cost for judges and clerks at any election.

CHAIRMAN SAMSON: Would that be for the City of St. Joe?

MR. SCHOENLAUB: Yes.

CHAIRMAN SAMSON: And that is $12,000?

MR. SCHOENLAUB: Yes.

CHAIRMAN SAMSON: Now, I am a little bit at a loss and if you can answer, fine, and if you can't, I will understand. Do you have any other dates in mind on this schedule that the Government has come along with?

MR. SCHOENLAUB: No, I haven't, my only comment being that the dates set up in the schedule submitted by Mr. Hopkins should be changed to follow those set at Sioux City, that being the upriver city with the same problem.

I think, off the record, if I may say this, that any election held on this matter would, in my own personal opinion, stand a greater chance of succeeding if at the time the proposal is submitted to the people it could be shown that we aren't standing out here on the Missouri River by ourselves with the upriver cities continuing to pollute the Missouri River as it flows past St. Joseph.

CHAIRMAN SAMSON: Let me ask you in connection with the bond issue, if it is a revenue bond issue would the legal problems in connection with that have to be submitted to bond counsel?

MR. SCHOENLAUB: Any bond issue it is handled by the law firm of Stinson, Mag, Thompson, McEvers and Fizzell in Kansas City. They handle all bond issues of any nature for the city.

CHAIRMAN SAMSON: What is the approximate length of time, if you know, that it takes to set that sort of a procedure up?

MR. SCHOENLAUB: It would take a minimum of 41 days.

CHAIRMAN SAMSON: That is, the ordinance and the opinions and all those clearances?

MR. SCHOENLAUB: Well, now, no, that is the formal procedure of the ordinance and establishing the date of an election and the proper publication.

CHAIRMAN SAMSON: That requires 41 days. Then after that must you submit all those procedures to your bond counsel?

MR. SCHOENLAUB: During that time, which would probably extend the time past 41 days --

CHAIRMAN SAMSON: I see.

MR. SCHOENLAUB: -- each step is submitted to the bond counsel. No action is taken at all without approval by the bond counsel.

CHAIRMAN SAMSON: I see.

I have no further questions. Thank you very much, Mr. Schoenlaub.

Mr. Brown, glad to hear from you.

MR. BROWN: Thank you, Mr. Chairman. Gentlemen.

It seems to me that since this is a matter for the entire river basin that the only proper and logical way to approach it is to consider the basin as the prime problem and this a mere component part. The Government has stated that its intention is to clean up the entire Missouri River Valley. Therefore, I think we should consider the whole Missouri River Valley.

Now, from the standpoint of testimony -- I am not so much concerned with the law -- but from the standpoint of testimony, actually, if you want to consider the testimony introduced by the Government in this case, even admitting this is an administrative hearing, administrative hearings are to be conducted generally in line with the rules of evidence applying in the locality, and this hearing is completely hearsay testimony with the exception of five or ten percent.

Nevertheless, and I would be the first person to concede it, the testimony does show that there is pollution in the Missouri River, not only from St. Joseph, not only from Omaha, not only from Sioux City, but from every square acre of ground that surrounds it, from all the tributaries and from all of the other towns that go up and down the Missouri River.

Now, Mr. Samson, you come from this part of the country and you are pretty familiar with the history of the Missouri River. It has always been known as the Big Muddy and mud denotes silt and silt denotes contamination. This was a great buffalo country. I think when Joliet and Marquette passed the mouth of the Missouri the journal shows that there was a large river coming in from the west filled with mud and logs and floated buffaloes. That was organic contamination in those days.

At the time, if you will read the book by Stanley Vestal, The Missouri, you will find that Stanley Vestal says prior to the time of Emanuel Lessa no one thought the upper Missouri was navigable by anything but canoes, and then he went on to explain it was so full of debris and dirt and so swollen by floods and mud that the only way you could get up it was by canoes.

That all denotes contamination and that contamination existed long before we were here. It exists at the present time. Instead of buffalo droppings and fecal matters it comes from hogs, cattle, livestock of various kinds. It is common knowledge that the large river ports on the Missouri River are now the large packing house centers. Omaha, Sioux City, St. Joe, Kansas City. The packing houses move close to the source of supply. The source of supply, therefore, lies right within this area here. And I think anybody would be a fool to deny that whenever there is a rain that from the millions of animals, livestock animals, that are in the lots and the farms in the Missouri River Valley there are tons and tons of organic waste, fecal waste, washed into the Missouri River.

Now, I say that because this is testimony, their testimony in this case about the pollution of the Missouri River. Let's get to the testimony of the pollution. According to Mr. Kittrell, even if all our waste is removed and everything else is removed you still have a contaminated stream. The pollution of the Platte River, the only river on which they gave any figures, was 12,000 coliforms, 12 times what they want for swimming water.

Now, it is common knowledge or it is common sense, the Missouri River is merely a large body of water produced by thousands of small tributaries and if each tributary is polluted to 12,000 coliforms, when it gets together in the Missouri River it is going to be polluted. There is no one witness who has said we can achieve what is represented in that chart, Exhibit 25, even if we reduce every tiny bit of municipal and industrial waste in this river. Nobody said that.

Again I will go back and I will concede that it is a good law. I think the law was needed. I don't think it is right for the citizens to dump their fecal matters and their municipal wastes and their industrial wastes into the stream. But I think it is wrong for the Government to come along and attack it if their only reason for attacking it is to say that we are aiming at something which we know is impossible.

Now, bear in mind, gentlemen, this Water Pollution Control Act was passed by the people of this country because they believed in clean streams and clean water and if you are going to try and sell it to them by force you are liable to find the people are going to raise up and say, well, we can't achieve what we thought we could, the cost is too great, and you might have no water pollution control law. And that, so help me, would be the worst thing that could happen.

Let's get back to their testimony here about this pollution. There is a certain amount of pollution comes out of the municipal sewers. I don't know enough about the way it should be manipulated, but it would seem to me that you could start at each sewer and take readings at the same location below each sewer, enough of them, so that you could gradually get an actual picture rather than an estimated picture of the pollution. I think you could do the same thing at the stock yards sewers except you would have a difficult time, even with Mr. Clark's fecal coliforms and fecal Streptococci, I think you would have a difficult time separating out the municipal wastes there and the industrial wastes. That was not done. It is all on a speculative basis.

But we have this pollution and this pollution, according to them, is in violation of the law because it is detrimental to the health of people in foreign states, other states, interstate.

Now, what has intrigued me in this whole situation, there are no comparative figures from any other watershed. Certainly the Public Health Service must have gone up and down other watersheds. We have nothing with which to compare our situation in this case. They have gone further and they have charts, some of these charts rise to great peaks and go down into almost an abyss. The peak shows one hundred thousand, two hundred thousand coliform. And yet there is not one word of testimony in this case that the disease rate of any disease in any community on the Missouri River was affected even one iota by the peak or by the abyss.

Now, if you are trying to protect the public health, it seems to me the thing to do is to show that when it isn't protected the public health suffers. Everybody says yes, we think so. Mr. Clark says, "As a bacteriologist I think this", and Mr. Kittrell says, "I think this", and I would be the last man to disagree with them, because I will say that I think we got the works. I think we got the top people here and I enjoyed seeing them and I am tremendously impressed by their ability. I think they are a very fine group of men. But nevertheless it is still speculative.

They say, well, boys, we can't even catch fish in the river. So they bring a fellow in here that weighs 200 pounds from eating Missouri River fish for 35 years, with a whole host of customers who constantly come back to him, and he says, "Missouri River fish is the best fish in the United States." Now, that is the testimony from the Government about the fisheries being hurt.

My friend, Herb Fisher, had to admit that catfish which inhabit the river--several of these fishermen said--Herb Fisher said, "Yes, you use chicken entrails and anything you can get that is rotten and bad." Now, it isn't logical, it actually doesn't bear upon the final question. But it is such an illogical way to accuse this city.

I would like to see more concrete evidence because we have got to go out and sell this to the citizens of St. Joe. And how are you going to sell the citizens of St. Joe that the fishing has been hurt in the Missouri River with the testimony we have here? How can we tell the citizens of St. Joseph that this renders the river unsuited for motor boating when the testimony is that in the past three years outboard motor boating has increased 400 percent?

People are swimming. I thought I was the only person in the room that ever swam in the river, but I find there are a few people swimming in it. I wouldn't swim in it if you would give it to me now, but nevertheless people are swimming in it. There is water skiing. So actually the sport is increasing and to say, well, it would be greater, isn't that rather speculative?

Now, what do we get down to? We get down to a factual situation where Omaha puts out waste, we put out waste, Sioux City puts out waste, Yankton puts it out, I am sure if we go up to Pierre and on up to Bismarck and Mandan you will find more waste up there. There is only one way to treat the Missouri River as I see it, one of two ways. Either you should treat it as an entity and make an over-all survey on all of the river ports and say to all of them at once, "Now, boys, you are going to have to clean up and let's get it done", or you should, as you did, start upstream and move downstream; I don't think you could ever move downstream and come up. But, so help me, you get to St. Joe and you don't move either way. You have just got us stymied.

Now, if people will read this law, the law is not a bad law. But it says that in enforcing the law "shall make recommendations to the Secretary concerning the measures, if any, which it finds to be reasonable and equitable to secure abatement of such pollution." "Reasonable and equitable." And that is under Section 8 Paragraph (e).

So at the last moment, being reasonable and equitable, the Secretary presents a bunch of recommendations before a hearing is completed when he couldn't have possibly seen the evidence, but he has got his recommendations in. Now, it was stated down here openly before the hearing was held that it was prejudged. I said it is not. It is not prejudged and there isn't any question in my mind that so far as this Board is concerned it is not prejudged and will never be prejudged. But when you can bring in a bunch of recommendations before the testimony is concluded and say to me that it is not prejudged, I just won't buy it.

Again I don't think it is reasonable or equitable. And if it isn't reasonable or equitable, then this city is entitled to some fair treatment.

Now, what does the record show here? They want us to move in face of very serious opposition in a manner which is just impossible. They say that the reason they didn't make Kansas City move before St. Joe is because we must do it first and then Kansas City. But then, according to Mr. Hopkins, we must move before Sioux City and we have to move before Omaha. Now, if it is logical for us to move before Kansas City or if it is logical to let Kansas City wait until we move, then certainly the same logic applies under this Act; it must be reasonable and equitable and the same logic applies, and we should not have to move until Sioux City has moved and Omaha has moved. And there isn't any testimony here about the target date on Omaha. The only testimony is that their next election is next year.

Now,frankly, I don't know what is reasonable. I know you would like to know, you would like a suggestion.

CHAIRMAN SAMSON: I think we would like to have a suggestion. We would like to have a suggestion, Mr. Brown.

MR. BROWN: I just don't know what would be reasonable. I can say this, and I am speaking here as a citizen again, because I haven't had a chance to talk to my clients. Despite what Mr. Hopkins says, this is going to require a lot of selling, there isn't any question about that, and I just wish--this has been informal and I will say these gentlemen have been extremely courteous and I wish I could have talked to them before they put those recommendations in because from my standpoint they just blew up all of the good they had accomplished down here. I think people -- I know the paper, I know my friend Scoop over here has begun to realize that pollution is something we are going to abate, and the paper realizes it. But when you come in with something like that you have undone so much. We have got a terrific job. We have got to sell 10,000 people that came in annexed when most of them didn't want it. They fought it clear up to the Supreme Court of Missouri. Now, those people are hostile. They don't want to pay one red cent. They have got to understand it.

We, as you see, the seven industries, are all investigating what can be done. They all have investigations under way. Despite Mr. Hopkins' testimony, I don't believe that it is possible to get logical plans even formulated in under six months.

There is another thing that hasn't been commented on --

CHAIRMAN SAMSON: You are referring now to -- I didn't mean to interrupt you.

MR. BROWN: It was my understanding that it would take the engineers at least six months to get the data together on which they could base their information that they would give both the city and the Stock Yards Company.

There is another item or another factor in this that should be considered. Mr. Schoenlaub and his entire staff, his two other assistant City Attorneys, are leaving the city's employment the first of September, I believe it is, or the 15th. That leaves the city without legal counsel. Whoever comes in will come in unfamiliar with the situation. Now, that is a bad situation.

So you have bad publicity, as I see it, you have hostility from the annexation group, you have at least six months' time for the engineers to get together their data. I don't see how it is humanly possible for this city to get their data together and pass on a bond election before, oh, -- what is this? -- I would say it would take them seven months, because the engineers have got to get their data together. I would say it would take seven months at a minimum to get their bond election and get started.

Now, after that I think the timing of the construction and things like that should be correlated with what goes on at Sioux City and Omaha. You gentlemen have those figures. I think it is much easier for us down here to tell our fellow citizens what has to be done if we can say there is a logical sequence.

Now, I have no excuses to make for what they did. I think they were badly advised when they turned the bond issue down before. But you know human nature and you know what people are and, as I said earlier, you can catch a lot of flies with honey and you can catch darned few of them with vinegar. And we are just not going to catch the flies down here to put this bond issue over, as I see it, unless it is explained to them logically and they are told, you fit in a logical sequence with everybody else and you have got to get busy.

Again I want to say, I don't deny pollution, my industries don't deny it. That is the reason I read the statements. My industries are ready, willing and able to do whatever has to be done. I think the city, I am sure that the city, with a little urging and a little enlightenment, will agree that one primary sewage plant is far better than two. If it doesn't, there isn't anything we can do except form a sewer district and get our own federal aid and build our own plant. That is a duplication of efforts and I think it is ridiculous, but if we can get the city started, if you gentlemen can write a report that gives us a little boost rather than excoriating us, I think we will get the job done. If you don't, I think, unfortunately, we are going to have trouble for a long, long time.

I want to thank you for your patience and time. It has been tedious but I have enjoyed it and I hope you have enjoyed it.

CHAIRMAN SAMSON: Thank you, Mr. Brown.

Any questions by the Board of Mr. Brown?

Anything further now by the Government?

MR. STEIN: Yes. I just hope that closing statement by industry will do the bond issue some good.

To get to the first point, the one raised by Mr. Schoenlaub. As I understand the 1958 bond issue was a special election. I understand the city preferred to hold it that way.

CHAIRMAN SAMSON: What did you say, Mr. Stein?

MR. STEIN: The previous bond issue that was voted down by the City of St. Joseph for the sewage treatment plant that was held in either March or April '58 was a special bond election. It wasn't held on a regular election date. And the city people preferred to hold a special election for this and possibly some other issues rather than to wait for the special election date. This was done before.

Now, the next point, this question of hearsay. First, this is an administrative hearing; secondly, I think if we conducted an examination and a careful examination of the record it will reveal that what we put in in large measure was based on the most careful and painstaking scientific observation, work and evaluation. In accordance with the rule governing administrative hearings, if you examine the record and review that evidence, that is subject to connection, you will see at the conclusion of this hearing that it has all been connected. And I am confident, and my co-counsel is, that this will stand up in any Federal Court.

The third point we have, this has come up time and time again, is this question of runoff. Up and down the Missouri Valley you hear the same thing, the pollution is coming from the vast runoff and the cattle. The scientific testimony here shows that Mr. Kittrell examined all the significant tributaries. He didn't find any significant contribution. If he did, that die-off curve couldn't have been that smooth. That was explained by Mr. Kittrell in his testimony. You can't have a curve like that if you have significant runoff.

Mr. Clark was asked about that and he said the runoff was so insignificant he didn't take it into account in thinking about the problem for his calculations.

So much for runoff.

"There was no demonstration of danger or disease." Maybe we have short memories, I don't know, but I seem to have heard Mr. Weatherford say he was operating at top capacity and there was a breakthrough in his plant. To get a reportable disease, such as typhoid or something of that sort, is a catastrophe I don't think we have to wait for. We all know the enteric diseases and diarrhea are nonreportable diseases and are water-borne. The evidence has indicated that very clearly.

Now, the next point is a point we hear all the time and that is why don't we treat the whole Missouri Valley as an entity. We have found administratively that we have to take separate segments if we are going to get anything done. Mr. Brown gave us the best example of why we don't treat them as an entity, because when you do, St. Joseph looks to Omaha, Omaha looks to Sioux City, St. Joseph goes downstream and looks to Kansas City, and Kansas City looks to St. Louis.

Now, we have to agree that we have to keep this problem on an equitable basis, moving it all together, but for, lo, these many years the administrative agencies that have tried to clean up pollution in a large river basin as an entity and deal with that big problem have been stymied by just that kind of opposition, and I know Mr. Brown will agree with me, if he looks at the record, that this has been demonstrated as not the way to do it and it has been demonstrated as the way to let our rivers get worse and worse.

Now, let's look at the other streams. We will look at the other streams. This river is one of the few major remaining rivers in the United States where major cities provide no treatment at all and the water downstream is used as a source of water supply. Look around the country and see what you have, and I am sure if we attempted to introduce that that Mr. Schoenlaub would have been the first to object that it wasn't very relevant to the present situation.

One last point, as to the recommendations. Again I say, we put those recommendations in as early as we possibly could based on our evidence. Obviously these recommendations could not have been put in before we presented our case as people would not know the basis for them. We gave Mr. Schoenlaub, Mr. Brown, Mr. Wilcox and others, and the Board, an ample opportunity to discuss these recommendations, to adduce extra information and facts. We didn't leave these recommendations for the end after they had presented their case. And for this there is a notion that this thing has been prejudged. I think precisely because we put the recommendations in that early and gave a full opportunity for discussion and airing of them is the indication, I think, of the attitude with which they came to this hearing.

Now, I want to express my appreciation to the Board and Mr. Brown and Mr. Schoenlaub. I think they have exercised indulgence and restraint with us and I hope they will think that we have exercised restraint in presenting the case in a sober and unflamboyant manner.

Thank you.

CHAIRMAN SAMSON: Is there anything further by any parties to this hearing?

There being nothing further, the Chairman declares the hearing adjourned for this purpose and the hearing committee will retire for executive session.

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## REPORTER'S CERTIFICATE

I, VIRGINIA HOUGH RANKIN, do hereby certify that I was present at the time and place first hereinbefore set forth, the aforementioned parties appearing, that I took down in shorthand the entire proceedings had at said time and place, afterwards transcribed said shorthand notes, and that the foregoing 775 pages constitute a true, correct, and complete transcript of my said shorthand notes.

Shorthand Reporter